AN ABSTRACT OF THE DISSERTATION OF

Lori D. Carter for the degree of Doctor of Philosophy in Education presented on March 15, 1995. Title: Effectiveness of Case Based Method versus Traditional Lecture in the Retention of Athletic Training Knowledge.

Abstract approved: Redacted for Privacy

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The use of the case based method of teaching has become widespread in many different professional education programs such as business, medicine, and teacher education. However, controlled experimental research to study the effectiveness of this teaching method is limited and what does exist is inconclusive. In this study the effectiveness of the case method of teaching was compared to traditional lecture in the retention of athletic training knowledge with group discussion included in both methods. In addition, a subjective measure of subjects' level of learning was studied through the use of an attitude questionnaire. Thirty-six undergraduate students who were athletic training majors at the same four year institution volunteered for this study. The subjects were randomly assigned to one of four treatment conditions: case study, case study with discussion, lecture, and lecture with discussion. The main experimental data utilized a 4x2x2 (teaching method x injury topic x test time) MANOVA with repeated measures on the last two factors to examine each hypothesis at the .05 level of significance. The dependent variable was a 20 item multiple-choice examination over two athletic training injury topics. Results showed no statistically significant difference between teaching method on the multiple-choice examinations $F(3) = 1.11$, $p = .360$. There was also no significant interaction effect of teaching method by injury topic by testing time $F(3) = .83$, $p =$

.488. The study did show that subjects in the case, case with discussion, and lecture treatment groups scored significantly higher on an immediate post-test compared to a post-test taken four weeks later. However, the subjects in the lecture with discussion treatment showed no significant difference between the two testing times $F(1) = .01$, $p = .934$. A subjective measurement of learning was also studied with the use of an attitude questionnaire. Results of the Kruskal-Wallis one way analysis of variance showed no significant difference between teaching method on attitude; chi square(3)= 3.23 $p = .3574$. The results of this study do not support anecdotal claims that the case method of teaching is more effective than the traditional lecture method of teaching.

Effectiveness of Case Based Method versus Traditional Lecture in the Retention of Athletic Training Knowledge

by

Lori D. Carter

A DISSERTATION

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Doctor of Philosophy

Completed March 15, 1995
Commencement June 1995

Doctor of Philosophy dissertation of Lori D. Carter presented on March 15, 1995

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I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

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Lori D. Carter, Author

This dissertation is dedicated to my parents, Jerry and Sharon Carter, for their unconditional love and constant belief in me.

ACKNOWLEDGMENTS

No person should undertake the doctoral process without having very knowledgeable, motivational, cooperative, and supportive people in their corner. I was very fortunate to have these people. Therefore this author would like to thank the following individuals for their contributions:

. . . Dr. Jodi Engel, for her knowledge, encouragement, and willingness to act as my program and dissertation committee chair. I would also like to thank Dr. Engel for her unwavering belief in my abilities.

. . . Dr. Rod Harter for serving on my committee and for his mentorship and friendship throughout the years.

. . . Dr. Dow Poling for serving on my committee and always having a positive outlook and a kind word.

. . . Dr. Ken Ahrendt for serving on my committee and his many years of dedication and contribution to the profession.

. . . Dr. Ed Schmisseur for representing the Graduate School on my dissertation committee and for serving both willingly and effectively.

. . . I would like to express my love and appreciation to Dr. Michael "P.B." Greenwood for his love and support. Thank you for coming into my life when I needed you the most.

. . . Dr. Kathy Campbell for her knowledge, support, time, and friendship. Thank you for listening to me when I was in my "fuge" states.

. . . Dr. George Oberle for his experience and great motivational abilities. Thank you for your personal and professional faith in me.

. . . Dr. Carl Cramer for his support and knowledge in the area of athletic training and for his and his family's hospitality to me in a "different country".

. . . Natalie Martin for her support, friendship, and creativity in the case writing process.

. . . Kim Witsken for her loyal and reliable assistance in the data collection process.

. . . I would like to thank all the faculty, staff, and students at Barry University and Oregon State University who have supported me in this venture as friends, colleagues and subjects.

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

LIST OF TABLES

Effectiveness of Case Based Method versus Traditional Lecture in the Retention of Athletic Training Knowledge

CHAPTER I
INTRODUCTION

Pursuit of the most effective teaching method for conveying information to students is a common theme that runs through various educational programs. Pedagogical researchers have studied the effectiveness of many different methods of teaching such as lectures, discussions, role playing, video-taped instruction, and game playing (Dana & Floyd, 1993; McKeachie, 1986; Sox, Marton, Higgins & Hickam, 1984; Wolf & Guth, 1975). The case based method of teaching is currently attracting attention in the literature and the use of the case based method of teaching has become widespread in many different professional education programs. Professions such as business, law, medicine, and teacher education have adopted the case based method of teaching as part of their curriculums (Carter & Unklesbay, 1989; Christensen & Hansen, 1987; L.S. Schulman, 1992; Taylor, Pels, & Lawrence, 1989). Practitioners of other professions such as public administration, economics, early intervention, veterinary medicine, higher education ministries, and library education have written about the positive aspects of applying the case method to their fields (White, 1984; Tedesco, 1981; McWilliam, 1992; Edmondson, 1993; Evans, 1980; Galvin, 1973).

The use of the case based method of teaching began at The Harvard Law School in 1870 (Carter & Unklesbay, 1989). In 1908, when Harvard's Graduate School of Business Administration began, it utilized case studies in its curriculum (Merseth, 1991). This method of teaching evolved from single cases being

introduced in courses in the early 1900's, to every course being case-based taught beginning in the 1960's (Christensen & Hansen, 1987).

In 1986, Lee Shulman brought the idea of case based instruction for teachers to national attention in his presidential address to the American Educational Research Association (AERA). In his address, Shulman called for the wide spread use of cases in teacher education. Shulman also stated that case based instruction was a vital agenda for research. Since then many case textbooks have been written to be used in teacher education programs.

A report in 1984 by the Association for American Medical Colleges (AAMC) urged medical schools to provide more active learning experiences by reducing lecture time and emphasizing individual learning skills (Christensen & Hansen, 1987). Shortly after the AAMC's report, The Harvard Medical School instituted its New Pathway Program which utilized case based instruction through out the curriculum.

In 1978, Hill described law, medicine, and teaching as applied disciplines because they have a clinical focus. Athletic training, which is an allied health profession specializing in the prevention, recognition, management and rehabilitation of athletic injuries, also, has a clinical focus (Arnheim & Prentice, 1993). With the extensive use of the case based method of instruction in applied disciplines of law, medicine, and teaching, it is logical to investigate the use of this teaching method for the applied field of athletic training.

Proponents of the case based method cite its greatest strength as the ability to help novices in the decision making/problem solving processes. (Christensen & Hansen, 1987; Harrington, 1991). According to Florio-Ruane (1990), case based teaching may be one way to provide novices with experiences in decision making/problem solving, while not overwhelming them with the complexity of "real-life" situations. Case studies act as a bridge between

classroom theory and practical field experience. Proponents of the case based method cite the enhancement of retention and the transfer of information as another of its strengths (Neufield, 1974).

Although many professional education programs utilize case based teaching and have implemented the case method across the entire curriculum, (Christensen & Hansen, 1987; Kreps & Lederman, 1985; Taylor, Pels & Lawrence, 1989) few studies have attempted any empirical examination of the claims for the case based method of teaching. According to L.S. Shulman, ". . . [We] do not have evidence that case-based approaches work any better than lecture or discussion. Ironic that after so many years of application in business, law and medicine, no comparative evaluation exists that confirms the widely held belief that cases are more motivational, promote better transfer from theory to practice and produce better problem solvers and critical thinkers" (L.S. Shulman, 1992, p. 22). Masoner in 1988, conducted a thorough review of the case method literature and found mostly anecdotal evidence of its effectiveness and unpublished studies in various professional fields. Since 1988, except for a few research studies which have looked at student attitudes and grade point average changes over time (James, 1991; Kleinfeld, 1991; L.S. Shulman, 1992), there have been few controlled experiments to study the effectiveness of the case based method of teaching as it compares to traditional lecture. The literature is completely void of empirical studies in athletic training education.

A component of the case based method of teaching that has received attention in the literature is the case discussion. Some authors feel that discussion is the key to the case based method of teaching (Christensen & Hansen, 1987; Silverman, Welty & Lyon, 1992). Other authors (Carter & Unklesbay, 1989), have criticized the case based method of teaching for taking too much time for discussing cases. Kober, in 1980, stated that law professors

who utilize this method of teaching humiliated their students during case discussions. While many educators are utilizing the case based method of teaching, there has been little empirical research to study its effectiveness and no research to compare the effectiveness of this method of teaching with and without discussion.

The use of the case based method, by a variety of professional education programs, makes it timely to design a controlled experiment in order to test the hypothesis that the case method is more effective than traditional teaching methods. For the purposes of this experiment, lecture will be used as the traditional teaching method. Due to the disagreement in the literature concerning case discussion, group discussion will be included in the experiment. Athletic training was chosen as the applied professional area to be studied because it is a rapidly growing field devoid of pedagogical research.

Purpose of the Study

The primary purpose of this study was to compare the effectiveness of the case based method of teaching to traditional lecture in the retention of athletic training knowledge with group discussion included in both methods. A secondary purpose was to obtain a subjective measure of the subjects' levels of learning through the use of an attitude questionnaire.

Statement of the Problem

Five main problems were examined in this study. First, the effectiveness of the case based method of teaching with and without discussion was compared to the effectiveness of the traditional lecture method of teaching with and without group discussion utilizing scores on a multiple choice examination as the

dependent variable. The second problem considered was the difference in performance between two athletic training injury topics, orbital blow-out fracture and anaphylactic shock secondary to a bee sting. The third problem considered was the difference in performance between the two test times, immediate post test and four week delay post test. The fourth problem considered was the interaction effect of teaching method, injury topic, and test time on performance. The fifth problem considered was the attitude of the subjects regarding the learning effectiveness of the different teaching methods.

Subproblems

The subproblems investigated the development of the materials and testing tools to be used in this experiment. Two case studies on different injury topics were created based on documented injury reports. Accompanying lecture scripts over the same injury topics were created as well as two 20 question multiple-choice examinations. Three discussion questions were written reflecting the information contained within each case study and lecture script. The case studies, lecture scripts, examinations, and discussion questions were all validated by an expert panel in athletic training education.

Definition and Explanation of Terms

1. Case based method of teaching/case method - a method of teaching which utilizes a case study.

2. Case study - A compelling narrative, with a beginning, middle and end, and situated in an event or series of events that unfold over time" (J. H. Shulman, 1991, p. 250).

3. Facilitator - The role an instructor plays when they question, listen, challenge and encourage students' analysis and problem solving skills (McKeachie, 1986).

4. Teaching method effectiveness - score on a 20 question multiple choice examination.

5. Traditional lecture - a teaching method where the student passively listens to a lecture and takes notes on that lecture.

Hypotheses for the Study

The following hypotheses were examined in this study at the .05 level of significance:

1. There is no significant difference among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD) in the performance of athletic training students on a multiple choice examination over two injury topics: orbital blow out fracture and anaphylactic shock secondary to a bee sting.

2. There is no significant difference among the injury topics, orbital blow out fracture and anaphylactic shock secondary to a bee sting, in the performance of athletic training students on a multiple choice examination.

3. There is no significant difference among testing times, immediate post- test and four week delay post-test, on the performance of athletic training students on a multiple choice examination over two injury topics, orbital blow-out fracture and anaphylactic shock secondary to a bee sting.

4. There is no significant interaction effect among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD) by test time: immediate post- test, four week delay post- test in

the performance of athletic training students on a multiple choice examination over two injury topics, orbital blow-out fracture and anaphylactic shock secondary to a bee sting.

5. There is no significant interaction effect among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion by injury topic: orbital blow-out fracture, anaphylactic shock secondary to a bee sting in the performance of athletic training students on a multiple choice examination at two test times.

6. There is no significant interaction effect between injury topic, orbital blow-out fracture, and anaphylactic shock secondary to a bee sting, by test time, immediate post- test and four week delay post- test in the performance of four groups of athletic training students on a multiple choice examination.

7. There is no significant overall interaction effect of teaching method by injury topic by test time in the performance of athletic training students on a multiple choice examination.

8. There is no significant difference among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD) on the attitude of athletic training students regarding the method of teaching the injury topic anaphylactic shock secondary to a bee sting.

Limitations

The following were limitations of this study:

1. The subjects are volunteers.

2. The subject's degree of effort when learning the material and taking the examinations.

3. The subject's previous exposure to the topic of shock.

Delimitations

The following were delimitations of this study:

1. The subjects were male and female university students who were athletic training majors at the same four year institution.

2. Subjects were limited to those athletic training students available between the hours of 12:00 and 1:00 PM, Monday, Wednesday, and Friday between September 7, 1994 and October 20, 1994.

3. Subjects were limited to those individuals who followed the study instructions.

CHAPTER II
LITERATURE REVIEW

Controlled empirical research regarding the effectiveness of the case based method of teaching is limited. Controlled pedagogical research in the field of athletic training is void in the literature. This review will address the history and definitions of the case based method of teaching. A discussion of the controversy surrounding this teaching method and its components will be included as well as the reported strengths and weaknesses of the method. The research that has been conducted on this subject will be detailed and, a brief presentation of the field of athletic training will be covered along with the literature on the retention and decay of knowledge.

Definition of the Case Method

"The case method of teaching does not exist. The character of cases and case method varies widely from field to field and even within a single field. Sometimes discussion is advocated and sometimes not" (L.S. Shulman, 1992, p. 1). Shulman's statement gives a very concise summary of the literature regarding the definition of the case method. According to Argyris (1985), the case method of teaching is any teaching method that utilizes cases in the instruction. Dooley and Skinner (1977) comment that there are as many varieties of case methods as there are practitioners of the case method with the only common denominator, the use of a case study. The Harvard Business School's version of the case method of instruction includes the preparation, analysis and discussion of a business problem or decision (Christensen & Hansen, 1987). Williams gives a very broad definition of the case method as a ". . . type of teaching strategy which usually gives rise to a variety of participatory learning

activities during the instructional process" (1985, p. 3). The case method is defined by Donaldson (1990) as a teaching method that confronts students with descriptions of realistic human events, and then requires them to analyze, evaluate, and make recommendations about those events. Kreps and Lederman also, feel that the case method involves analysis of the case (1985). These authors describe the case method as providing learners with a case which they read, analyze and discuss. The case method has been described as a form of Socratic method or dialogue which is common to law teaching (Carter and Unklesbay, 1989) . Kober (1980) explained that the Socratic method of teaching utilizes a casebook of selected cases on a specific topic. The law professor has the students explain the cases and discuss the questions posed by the case. The professor does not teach, but provides the framework for the discussion.

The use of discussion in the case method of instruction is another area in the literature which is without agreement. Authors such as Hansen (1987), who is a practitioner of the Harvard Business School's case method of instruction, believes discussion to be an all important element of the case method. The discussion brings the case to life. Silverman, Welty, and Lyon (1992) agree that the class discussion is at the heart of the case method. They explain that the emphasis on discussion, by practitioners of the case method, stems from the Harvard Business School's example of how to teach with cases. Christensen (1987) explains the Harvard Business School's opinion of case discussion, while not researched, has merit in experience. He states that discussion teaching may be the most affective approach for enhancing a student's ability to apply general concepts and knowledge to specific situations.

There are many proponents of case discussion, however, there are also dissenters. Carter and Unklesbay (1989) feel that too much time is spent discussing cases. Law and business emphasize Socratic dialogue which relies

on sometimes heated discussions to analyze a case. Kober (1980) states that this form of discussion often leaves the law student feeling humiliated and confused. Andre (1979) found that subjects who were in a discussion group gave more similar answers to a question then did subjects who had not had discussion. Andre observed that subjects seemed to be copying each other's answers.

With all the different definitions of the case method and the controversy surrounding case discussion, the only agreement in the literature is that the case method uses a case study. However, there is disagreement as to what constitutes a case study or what comprises a good case study. An often cited definition is Lawrence's.

> A good case is the vehicle by which a chunk of reality is brought into the classroom to be worked over by the class and the instructor. A good case keeps the class discussion grounded upon some of the stubborn facts that must be faced up to in real-life situations. It is the anchor on academic flights of speculation. It is the record of complex situations that must be literally pulled apart and put together again before the situations can be understood (Lawrence, 1953, p. 215).

J. H. Shulman (1991) refers to a case study as a "teaching case" that is a compelling narrative with a beginning, middle, and end. "A story in context" is how McCorcle describes the case study (1984, p. 205). It should be a story that is rich in detail and deals with a significant issue or dilemma. There are also a variety of opinions on how to write a case, how long a case should be, and whether the case should be real or created. Hansen (1987) feels that a case should be short and should involve the reader's five senses. It should fill the reader with imagery that stimulates fantasy. Boehrer and Linsky (1990) state that a case can be a half page vignette to a multiple part document with tables and graphs. However, it shouldn't be any longer than fifteen pages or it will lose its vitality. Most cases are four to ten pages long (Stivers, 1991), but they can be

short or long depending on the level of the course (Leenders & Erskine, 1978). Boyce (1993) suggests that in writing a case, no matter the length, it is important that the narrative capture both the emotional and physical environment so that the reader feels they are a part of what is happening. According to Williams (1985), a case should be a reliably documented account of a real situation containing two types of information: data on the core and contextual information. Masoner (1988), in a review of the case method literature, found that some cases are real and some are "arm chair" cases created for a specific purpose or educational goal. Boehrer and Linsky (1990) feel that if the cases are not real, they should at least be realistic.

In utilizing the case method of teaching, since there seems to be no agreement on any aspect of the method except its use of cases, perhaps a more descriptive term would be the case based method of teaching. This would imply that the teaching method is based on the utilization of a case study to achieve its objectives. All forms of teaching with a case could be included in this descriptor.

Strengths and Weaknesses of the Case Method

All teaching methods have strengths and weaknesses. It is the pedagogist's job to research the strengths and weaknesses of each teaching method and determine which is appropriate for the established learning objectives.

Strengths of the Case Method

Neufield (1974) concluded that the use of individual clinical cases in medical curriculum had many postive aspects. He believed that this method of instruction had been shown to increase student motivation and encourage active

intellectual processes. The enhancement of retention and transfer of information were, also, observed. The case method's ability to model modes of thinking in many fields was cited by L.S. Shulman as one of its strengths (1992). He stated that the case method was able to accomplish this far more than traditional didactic pedagogies. Boyce (1993) listed reasons that the case method is used in preservice training of physical education teachers: (1) It bridges the gap between theory and practice; (2) it enables students to analyze problems and develop solutions for situations which will be encountered in the real world of teaching; (3) it aids students in recognizing that problems have more than one solution; and (4) it helps students to evaluate the feasibility of alternatives to a particular course of action. The development of critical thinking skills and the transfer of knowledge were cited by Boehrer and Linsky (1990) as purposes of employing the case method technique. They found that it enlivened the classroom dynamics and helped to foster collaborative skills. According to Leenders and Erskine (1978), utilizing cases which are high in imagery enhances the retention of information. The case method also gives the student an opportunity to put themselves in the decision maker's or problem solvers' shoes. " In medical analogy, the case provides the corpse for the student to practice on" (Leenders and Erskine, 1978, p. 11). Christensen and Hansen (1987) discussed strengths of the case method that had been observed at the Harvard Business School. These strengths are: (1) Provides context-bound knowledge; (2) requires higher order cognitive thinking; (3) promotes class discussion; (4) is Intellectually stimulating to both students and instructors; and (5) the development of new cases requires faculty to remain updated in the practical skills and knowledge of their profession.

Weaknesses of the Case Method

The weaknesses of the case method found in the literature are not as numerous as the strengths. Just as Christensen and Hansen (1987) listed the strengths of the case method, they also listed its weaknesses. According to these authors the weakness are: (1) The discussion component can be time consuming; (2) most successful with small groups; (3) requires an instructor that is willing to act as a facilitator and not as a lecturer; (4) writing cases is labor intensive; and (5) students and instructors who are not familiar with the case-based method may feel uncomfortable with a new teaching methodology.

History of the Case Method

The case method of teaching has been popularized by the Harvard Business School, however, use of the case method actually began at the Harvard Law School. In 1870, Dean Christopher Columbus Langdell of the Harvard Law School introduced the case method of instruction (McNair, 1954). Dean Langdell emphasized the analysis and discussion of individual cases. Although Dean Langdell believed that the case method constituted the shortest and the best way of mastering legal doctrine, his belief was vigorously opposed (Teich, 1986). Educators who were indoctrinated into the traditional lecture method of teaching, referred to the new method as an "abomination" (Teich, 1986, p. 170). One of the most consistent criticisms being that the case method expected students to think like experts when they were themselves only novices. During the next forty years, a controversy over the merits of the case method developed which still continues today. However, by 1915, the case based method of teaching was employed in most well known law schools (Culbertson, Jacobson & Reller, 1959).

The Harvard Corporation formally established The Graduate School of Business Administration in 1908, and the case system was emphasized as the instructional technique. In 1919, the Dean of the graduate school, Wallace B. Donham, made the decision that all instruction at the school would be case based. The purpose of which would be to educate students in the skills of analysis, decision making, and problem solving (Merseth, 1991). The case based method of teaching is still utilized by the Harvard Business School extensively in order to train their students, "not only to know, but to act" (Christensen & Hansen, 1987, p. 23).

The Harvard Business School's method of utilizing cases in the classroom has been used as the template for other professions such as medicine, and teacher education in their employment of this teaching method. In 1984, a report by the Association for American Medical Colleges (AAMC) urged medical schools to provide more active learning experiences by reducing lecture time and emphasizing individual learning skills. Under Dean Daniel Tosteson, the Harvard Law School instituted the New Pathway Program which effused the case based method of teaching into the medical curriculum (Christensen & Hansen, 1987). The Harvard Medical School was not the only medical program which followed the AAMC's recommendations. A variety of allied health professions such as nursing and pharmacology followed suit (Kaufman, 1985; Leuner, 1990).

The extensive use of cases, in law, business and more recently in medicine, caught the attention of practitioners in teacher education. Lee Shulman, the president of the American Educational Research Association (AERA) in 1986, called for cases to be used in teacher education for theory and decision making (L.S. Shulman, 1986). He argued for the development of a case literature whose organization and use would be profoundly and self-consciously theoretical. Shulman, also, believed that the cased based method of teaching

was a vital agenda for research in the area of teacher education owing to the fact that research on the case method was limited.

Case Based Method Research

The use of the case based method of teaching is extensive and the debate concerning the value of this method in professional education is intense. There is a large body of literature explaining the use of the case method and extolling its' value. However, few studies have attempted any empirical examination of the claims of the case method. Masoner, in 1988, conducted a review of case study literature which evaluated the case method. He found an assortment of varying levels of scientific and nonscientific examinations of the case method in a variety of fields. Most of the case study literature is found in business and education. For the purpose of this literature review, research studies of the case method will be organized according to profession: (a) business and administration (b) education (c) and medicine.

Case Research in Business and Administration

To develop decision making skills in graduate business students, McKenney (1962) compared the use of a business decision game to the use of cases. Subjects were all first year students in the Harvard Graduate School of Business. The business game condition used a class of ninety students who were divided into three product industries of six business firms. The goal of the game at the Harvard Business School was to provide production-planning decision experience and to demonstrate the interdependency of functional decisions within a firm. Students in another section of the same business course prepared and discussed four cases on production planning in lieu of the game

activities. The evaluation tools utilized were written examinations administered before and after the treatment sessions to test students' awareness of three business concepts. The research was conducted over a twelve week period. The Mann-Whitney U test was the statistical method used to test the null hypothesis that there was no significant difference between class sections in the awareness of business concepts when preparing a decision plan. Two out of the three concepts studied showed the business game as being significantly better than the case method at the .05 level of significance. McKenney concluded that the business game was better than the case method in conveying planning aspects of decision making and interrelationships of different business functions within a firm.

Wolfe and Guth, also, compared the case study method of teaching to a business game (1975). These researchers were interested in the effectiveness of the two methods in the teaching of business policy. Wolfe and Guth followed a similar testing method to McKenney (1962) using two sections of a course in business policy. They found that students in the case method group performed better in collecting abstract decision making information and the game students were better able to explain and describe principles presented to them.

A measure of the effectiveness of the case method in teaching human relations to students in a personnel administration course was conducted by Fox (1963). At the beginning of the personnel administration course, instructors gave students (N =312) a case to read and analyze. The same case was given at the end of the course. The two cases were "graded" on content and development of ideas. The data collection spanned several years at the University of Washington. No statistical analysis was conducted, however, Fox stated that it appeared that one-third of a class showed substantial improvement, one-third

moderate improvement, and one-third showed little or not improvement or even poorer performance on the second case analysis.

The effects of the order of teaching method presentation on personnel administration students was studied by Rickard (1966). The subjects were 46 graduate students in personnel administration who volunteered for the study for one hour academic credit. Rickard measured students ability to answer "in basket test-items", with two different teaching methods: lecture and case method. An "in basket test-item" was an administrative problem that had been pulled from the 'IN' basket of a college administrator. Subjects in treatment group one were taught using the lecture method for four weeks and then the case method for four weeks. The teaching method order was reversed for treatment group two. Because both groups were given both teaching methods, there was no control group. A one-way analysis of variance (ANOVA) was utilized in this study at the .05 level of significance. Rickard found no statistically significant difference in the order of teaching method presentation on the ability to solve "in basket test-items" $F(1,33) = 3.84$, $p > .05$.

Fisher, in 1972, studied the amount and direction of attitude change effected by the case study method compared with a reading/discussion method. Fisher's subjects were 36 college and university deans and vice presidents. Fisher utilized a matched group design with 18 subjects per group. A pre-test and a post-test on attitude was conducted. The test sessions were one hour and thirty minutes in length. The reading/discussion group read a position paper entitled, "Higher Education for Everybody Is Not Enough" with the author's identity removed. The group then discussed the paper. The case group read a case study which dealt with essentially the same subject matter and which presented the same ideas, concepts, and beliefs as the position paper. The case study group then discussed the case. Fisher stated that all subjects contributed

to the discussions, although, no measure was made of individual participation. Fisher found that the case study method significantly changed the administrators' beliefs and attitudes compared with the reading/discussion group.

Carroll, Paine, and Ivancevich (1972) used training directors in major corporations to obtain opinions on the effectiveness of the case study method and eight other teaching methods including role playing. The training directors ranked the teaching methods in the following areas: knowledge acquisition, attitude change, problem-solving skill development, interpersonal skill development, participant acceptance, and knowledge retention. The case study method was the only teaching method that ranked in the top four for all of the above areas. Role playing received a higher rank in attitude change and interpersonal skill development.

In his doctoral dissertation, Painchaud compared the perceptions of a group of German business executives to determine if case-study analysis education affected their decision-making processes (1985). Subjects were seventy-seven top-level executives in Europe. Painchaud divided the groups according to whether they had been involved with case method education or whether they had not. Interviews were conducted between September 1983 and February 1984. Twenty-two variables that effect managerial decision making were utilized as areas of interest during the interviews. Using the Mann-Whitney U Test all measurements were tested at the .05 level of significance. Painchaud found no advantage to the case method in affecting German executives decision making processes.

In a 1987 study, Orlansky investigated the attitudes of the 1960 to 1980 graduates of the University of Virginia Colgate Darden Business School toward the case method curriculum. A questionnaire was created utilizing a Likert-type scale which probed five areas, two of which concerned the case method:

satisfaction with learning by case method and worthwhileness of learning by case method. Orlansky found that Darden graduates were generally satisfied with their training and felt that the time and effort involved in learning by case method was worthwhile.

The effectiveness of the case study method was compared by Watson (1975) to the lecture method in teaching two types of learning: knowledge and understanding, and the ability to apply various management topics. Subjects were undergraduate students enrolled in three different sections of an introductory management course. There were 35 students in the first section, 38 in the second, and 44 in the third. The first two sections were taught by the case method and the third section was taught by the lecture method. The same professor taught all sections. The Kruskal-Wallis one-way analysis of variance by ranks was used to test whether the three groups learned equally in terms of two measures of learning: (1) knowledge and understanding; and (2) ability to apply. Learning was measured by means of two written examinations administered midway through the course and at the end of the course. Students in both groups taught by the case method gained significantly more knowledge and understanding than students taught by the lecture method in one of the topic areas covered, communication ($p < .05$). Both methods were equally effective in teaching knowledge and understanding of goals, organization, decision-making, leadership, motivation and change. Students in both case study groups showed significantly more ability to apply management principles and concepts in goal-setting $H(2) = 16.22$, $p < .001$, leadership $H(2) = 18.01$, $p < .001$, motivation $H(2) = 35.20$, $P < .001$, communication $H(2) = 29.18$, $p < .001$, and change $H(2) = 8.29$, $p < .02$. Watson used The Chi-Square Test for independent samples to test whether the two groups taught by the case-study method perceived and reacted to the course and to the professor differently from the lecture group. At a .05

level of significance there was no difference. At the .10 level of significance, Watson found that students in the case study group perceived the subject matter as being more complex and difficult than the lecture group (chi square = 21.79). Although, Watson did find the case method students performed better than the lecture method students on some of the knowledge and application topics, all groups were given case studies to read. The case method groups had to prepare the case prior to class whereas the lecture group was not given this assignment. The lecture group received a lecture on a topic prior to receiving the case on that topic. According to Argyris (1985), any teaching method that employs the use of cases in any way can be called the case method. With this in mind, the lecture method in Watson's study was a control group not a treatment group. The results showed a difference in the way the case study was utilized not a difference between the case study method and the lecture method of teaching.

In 1976, McDonald compared the case method of teaching to direct experience. Subjects in this study were seniors in a college course in business decision making (n=40). McDonald utilized a 2x2x2 (teaching method by dogmatism by class size) quasi-experimental non-equivalent control group design with pre and post-tests. The dependent variable was achievement, measured with six essay questions, change in attitude toward course concepts, and satisfaction/perceived learning. Canonical correlation analysis, T-test, and analysis of variance (ANOVA) were the statistical procedures that were used. Canonical correlation analysis showed no significant difference between groups at the .05 level of significance Canonical correlation = .36. A T-test comparing the groups means also showed no significant difference at the .05 level $T = 2.893$, $p = .07$. McDonald stated that an analysis of variance (ANOVA) showed no statistically significant difference between groups, however, this

researcher was unable to ascertain the specific values for this analysis. McDonald concluded that there was no statistically significant difference at the .05 level of significance between experimental groups for achievement, change in attitude, or satisfaction and perceived learning.

Reviewing the business literature on the use of the case study method yielded mixed results. Two studies which compared a business game to the case method showed the business game to be better for business decision making (McKenney, 1962; Wolf & Guth, 1975). Fox conducted a study which showed that just as many students improve as don't improve on their case analysis skills following a case taught course in human relations (1963). No comparison group was utilized and no statistical analysis was conducted. Rickard's study (1966) stated that a comparison between the case method and the lecture method of teaching was conducted, however, the only difference between treatment groups was the order which the teaching methods were employed. Watson, also, stated that a comparison between the case method and lecture method of teaching was conducted (1975). Cases were utilized by all the treatment groups, therefore, a comparison was made between different types of case methods not between case and lecture methods. McDonald (1976) did compare two different methods of teaching in his study. Case method was compared to direct experience with no significant differences found. Several studies investigated the attitudes of subjects exposed to the case method. Three studies showed a positive influence of the case method on administrators, and graduate students (Carroll, et.al., 1972; Fisher, 1972; Orlansky, 1987) while one study showed no advantage to the case method with executives (Painchaud, 1985) .

Case Research in Education

A variety of case research has been conducted in the area of education. Researchers have investigated the effectiveness of the case study method in teaching many different subjects. Most of the studies compare the case method to the lecture method of teaching. Butler, in 1966, studied the effectiveness of the case study method compared to the lecture/discussion method in teaching the social foundations of education. Two sections of a college course in social foundations were used as the treatment groups (N=47). One section of students was taught via the case study method throughout the semester, while the other section was taught with the traditional lecture/discussion method. Scores on a pre-experiment multiple-choice test were compared to scores on a post-experiment multiple-choice test. A T-test for means was used to determine if the groups differed significantly on the pre and post-experiment scores of achievement. A T-test for means was also utilized to look at the difference in beliefs about certain social and educational issues between groups. Both groups showed significant comprehension achievement. There was no statistically significant difference between groups at the .05 level of significance. However, the case study group was statistically different from the lecture/discussion group on subject's belief orientation. The case study method was found to have a significant impact on subject's beliefs at the .01 level of significance $T = -3.38$, $p < .01$. Butler, also, utilized a 2x2x2 factorial design (treatment by sex by scholastic aptitude) to determine if the difference between treatment groups was statistically significant. Analysis of variance (ANOVA) demonstrated no statistically significant difference at the .05 level of significance between groups $F(1) = 1.84$, $p > .05$.

Kleinfeld (1991) conducted a study to explore the effects of the case method in developing education students' abilities to analyze professional problems. In addition, Kleinfeld investigated the effectiveness of the case study method between young undergraduate education students and older students who could bring considerable life experiences to case discussions. Subjects were fifty-four students enrolled in an undergraduate introductory foundations course. All subjects were involved in a weekly lecture class and then randomly assigned to weekly section meetings taught either by the case method or by discussion of readings. Responses to a problematic situation on the midterm examination were used to compare teaching methods. Kleinfeld determined that case methods increased education students' abilities to spot issues in problematic situations, analyze educational dilemmas in sophisticated ways, and identify possible alternatives for actions. There was no difference in the effectiveness of the case method between young and older undergraduate students. Due to a failure of all students to answer the analytic questions, the ability of students to analyze classroom situations was inconclusive. Although, students expressed highly positive attitudes toward case method classes, there was no statistically significant difference found between teaching methods on attitude.

The case method pedagogy was studied in a preservice teacher education course by Tillman (1993). A quasi-experimental non-equivalent comparison group design was utilized to compare the case method of teaching to traditional lecture/discussion method in an elementary mainstreaming course. Two sections of the same course were utilized for the study. One section was taught with the case study method employing small groups to resolve problem cases (n=21). The second course section was taught with a traditional lecture/discussion method (n= 30). Tillman's primary hypothesis was that there would be no

statistically significant difference in achievement on a measure of course content between teaching methods. The statistical test utilized was not reported in the abstract, however, Tillman stated that there was no statistically significant difference between groups in course content achievement measured with a pre-test and post-test. To test the problem solving abilities between groups, pre-test and post-test case analyses were conducted. Tillman concluded that the group taught with the case study method demonstrated more mature problem solving abilities than the comparison group. Course evaluation questionnaires showed no statistically significant differences between groups in course satisfaction. Both groups demonstrated a very high level of satisfaction with the course.

Francine James conducted one of the most thorough investigations of the case study method in education (1991). The study compared case based teaching to traditional didactic instruction, (i.e., lecture and discussion) of preservice teachers in a course in classroom management. Student's ability to analyze problems in behavior management, their knowledge of behavior management principles, their attitudes toward behavior management and pedagogical method, and interactions between pedagogical method and student characteristics of complexity of thinking were examined. The study employed a quasi-experimental pretest-posttest design. Thirty-one teacher trainees were assigned to one of the two treatment conditions. Two instructors with experience in both teaching methods alternated teaching each group over the six week study period. Pre-test measures included the Defining Issues Test, the Hunt Conceptual Levels Test, and a written case analysis. Post-test measures included these same variables, plus an objective exam derived from the course textbook, a course evaluation, and attitude scales regarding behavior management and pedagogical method. Statistical analysis using analysis of variance (ANOVA), regression analysis, and T tests showed that both groups

improved significantly in ability to analyze behavior management problems. The only statistically significant difference between groups was in their attitude. The case method group had a significantly more positive attitude toward the use of systematic approaches to behavior management than the lecture/discussion group. Overall, except for the difference in attitude, there was no statistically significant difference between case method of instruction and traditional didactic instruction in the amount of basic course information gathered.

The most recent study of the case method of instruction was completed by Adam in 1994. The purpose of the study was to examine the potential use of the case method of teaching to achieve the educational goals set forth in the Ministry of Education's Year 2000 document for educational reform. Twenty-seven students who were enrolled in a eleventh grade Social Studies class in a large, urban high school were utilized for the study. The instructional program for the class followed the Harvard Business School's format for the case method of instruction. A qualitative research design was employed to investigate the ability of students to think critically, students' interest in learning, and their respect for the views, attitudes and beliefs of others. The data were analyzed through the triangulation approach. Adam concluded that the case method was a promising method of teaching for secondary school students and was consistent with the principles of learning in the Year 2000 document.

The use of the case method in multicultural education was studied by both Dana and Floyd (1993) and Sudzina (1993). Dana and Floyd designed a study to investigate the use of the case method in addressing multicultural issues in preservice teacher education coursework. A case on multicultural diversity was presented to four classes of 20 to 30 student teachers. The case described a learning disabled child and contained contextual information regarding the child's cultural background. The case was read aloud to the students, students reaction

to the case was recorded by the investigator, then cooperative groups created concept maps followed by role playing and group discussion. The sessions were video taped. Data were derived from documented analysis of pre-case and post-case discussion reflections written by students in the class. A statistical analysis was not conducted, however, the author concluded that the case method of instruction may provide an opportunity for preservice teachers to examine their beliefs, subjectivities, and biases and how these subjectivities and biases affect how they perceive teaching and learning situations.

Sudzina also studied the use of the case method in dealing with multicultural issues in the classroom (1993). Seventeen preservice teachers who enrolled in a sophomore educational psychology course each chose a case to present to the class for analysis and discussion. The cases were presented orally to the class with discussion following. The final exam was a clinical case study on a child from an urban field placement. Another class of thirty-nine preservice teachers in educational psychology were organized into cooperative learning groups. The same final exam was given as in the case group. Sudzina concluded that the case format increased understanding and comprehension of multicultural issues and served as a vehicle for communicating personal experiences, concerns, and commitments to successfully teach all students.

The case research in education is not consistent in its conclusions. Four studies compared the case method of teaching with traditional lecture method on achievement, problem solving and attitude (Butler, 1966; James; 1991; Kleinfeld, 1991; Tillman, 1993). None of the studies showed significant differences between groups on tests of achievement. Kleinfled (1991) and Tillman (1993) both concluded that the case method was better in tests of problem solving. Butler (1966) and James (1991) found subjects' attitudes to be more positive with the case method then with the lecture method. Kleinfeld (1991) and Tillman

(1993) saw no difference between groups in attitude. Three studies qualitatively analyzed the case study method's effectiveness. Adam found that the case method had a positive effect on students' critical thinking, interest in learning, and the respect for the views, attitudes, and beliefs of others. Both Dana and Floyd (1993) and Sudzina (1993) concluded that the case method was an effective teaching method for addressing multicultural issues in education.

Case Research in Medicine

Although the use of the case based method of teaching in medical education has been documented in the literature (Taylor, Pels, & Lawrence, 1989; Christensen & Hansen, 1987; Kaufman, 1985; Leuner, 1990; Neufield, 1974), only one empirical research study was found. Greenberg and Jewett (1984) studied the impact of two educational techniques on physician knowledge, performance, and patient care. The purpose of their study was to compare traditional didactic lecture (TDL) to a case study format (CP) in a one hour continuing medical education session (CME). Subjects were twenty three pediatricians who attended one of four CME sessions: headache, n=15; enuresis, n=11; behavior problems, n-11; and sleep problems, n=1. To measure cognitive knowledge, a multiple choice examination was administered to the subjects pre-session, post-session and six to nine months post-session. Six sets of mothers and children were selected for the study and were blind to the study design. Case histories were created for these sets based on the topics covered in the CME session. Within one year of the CME sessions, the sets of mothers and children visited one of the pediatricians for a school physical exam and a diagnosis that had been the subject of one of the CME sessions. The medical records of the visits were utilized to rate the appropriateness of the pediatricians'

diagnoses and treatment plans for a performance measure. Self reports by the physician were utilized to determine if the pediatricians had changed their diagnostic and treatment procedures after the CME sessions. Greenberg and Jewett (1984) found no statistically significant difference between teaching methods on physicians self report. There was also no difference between groups in subjects' knowledge measured with the multiple-choice examinations. Performance, measured by the diagnosis and treatment plans recorded, showed no statistically significant difference between groups in the recording of a diagnosis. There was a significant difference at the .05 level in the number of pediatricians who recorded an appropriate treatment plan (chi square = 6.39, p=.02). 80% of the pediatricians who attended the CP sessions recorded a plan for their patients while only 39% attending the TDL session did. Greenberg and Jewett (1984) admitted that their study had design flaws. Not all of the physicians completed the post-session exams, a small number of physician/patient encounters were recorded, the participants were not randomly selected, a matched control group was not used, and the mother/children sets were biased because they were trained in what to expect from the physicians.

Athletic Training

Athletic training is an allied health care profession which is concerned with the health and safety of athletes. Although some authors claim that athletic training dates back to the first Olympic games in ancient Greece (Arnheim and Prentice, 1993), modern athletic training is a fairly young profession. The governing body of the athletic training profession is the National Athletic Trainers' Association (NATA) which was formed in 1950. In 1970, the first NATA certification exams were held (Roy & Irvin, 1983). Candidates for NATA

certification are required to have an extensive background of both formal academic preparation and supervised practical experience in a clinical setting. Applicants for certification must have a bachelor's degree or be within one semester of completion. The academic preparation includes coursework in health, human anatomy, human physiology, biomechanics, physiology of exercise, basic athletic training and advanced athletic training (NATA Board of Certification, Inc., 1993).

The job of an athletic trainer involves a number of tasks in a variety of areas. In 1989, the NATA and the Columbia Assessment Services, Inc. (CAS) conducted a study to determine the primary tasks performed by an entry-level Athletic Trainer (Columbia Assessment Services, Inc., 1991). This role delineation study identified six primary tasks of an Athletic Trainer. These tasks are: (1) prevention, (2) recognition and evaluation, (3) management/treatment and disposition, (4) rehabilitation, (5) organization and administration, and (6) education and counseling.

Although there exists a growing body of literature in the athletic training profession, the pedagogical literature is limited. This researcher found no controlled empirical research in athletic training education. Perhaps, this is due to the relative youth of the profession.

Retention and Decay (Forgetting)

Part of the success of any teaching method is its ability to enhance knowledge retention in the learner (Christensen, Garvin & Sweet, 1991). For students to apply the knowledge learned in the classroom to a real-life situation, students must be able to retain the knowledge over time. Webster's dictionary defines retention as "... the power or act of remembering things; memory "

(1983, p. 1224). Retaining knowledge requires remembering the knowledge. To study the comparative effectiveness on retention of case based instruction to the lecture method, knowledge decay, or forgetting, must be considered. One of the well known theories of forgetting is Underwood's theory of interference (1957). Underwood theorized that learned material can be "interfered" with either by information learned prior to the new material or after. His two modes of interference are proactive and retroactive. Proactive interference occurs when material that has been previously learned impacts new material. Retroactive interference is the interference of present learning activities with what has previously been learned. Interference is greatest when new materials are being learned which have no inherent meaning to the learner or, when they are being learned by rote (Glover, Ronning, & Bruning, 1990).

To give meaning to information it should be placed within a context or background that is familiar or of interest to the learner. Craik and Lockhart's levels of processing theory hypothesized that meaningful information is processed more deeply so it is better remembered (1972). The ability to assign meaning to information, also, depends upon what preexisting knowledge is present to link to the knew information. A pre-existing framework of knowledge is called a schema (Rumelhart, 1980). Rumelhart's work on schemata formation has shown that information is better remembered when incorporated into an existing framework because this connects pieces of information together. Therefore, when encoding information for later retrieval, it is beneficial to include as much context as possible.

A second major theory of forgetting is really a theory of misfiling. Atkinson and Shiffrin's theory of memory stores suggets that our memory is similar to a library (1968). The information is there, it just can't always be found. Once a piece of information gets to the long term memory storage it stays there under a

file name. The key is to get information into long term storage under an easy to locate file name. This is where Neve's and Anderson's theory of encoding plays a role (1981). For information to be learned it must first be committed to memory, encoded. Encoded information is retrieved with the use of memory cues. These memory cues assist us in finding the correct file name. Material that is rich in both context and memory cues is better remembered. Material that is high in imagery is, also, better remembered. Paivio (1971) hypothesized that memory is enhanced when the learned material is high in imagery. Therefore, information which evokes the imagination will enhance memory.

Interference is one aspect of forgetting. Knowledge decay which is a function of time is another. Ebbinghaus, in 1885, studied retention as it is effected by time and found that eighty percent of information is forgotten after thiry-one days (Horton & Turnage, 1976). Spitzer (1939) conducted studies in retention where post-tests were given immediately, hours, and days after the learning occurred. It was found that knowledge decay reached its peak at twenty-eight days and no further decay occurred up to the sixty-eighth day.

Summary

The case based method of teaching is extensively used in professional education programs. The teaching method has been lauded for its abilities to enhance retention (Neufield, 1974), bridge the gap between the classroom and real life (Boyce, 1993), and stimulate discussion (Christensen and Hansen, 1987). A limited amount of research has been conducted to study the effectiveness of this teaching method. A majority of the research is inconclusive due to the lack of a comparison group (Fox, 1963; Rickard, 1966) or insufficient design and analysis for the intended study purpose (Watson, 1976). The

controlled empirical research that has compared the case method of instruction with the lecture method (Butler, 1966; Greenberg & Jewett, 1984; James; 1991; Kleinfeld, 1991; and Tillman, 1993) has shown no difference between the two teaching methods in tests of achievement. Butler (1966) and James (1991) did find that attitude was better with the use of the case method. Tillman (1993) and Kleinfeld (1991) found no difference in attitude. Research on the effectiveness of the case based method of teaching, though inconclusive, has been conducted in business, education, and medicine but it has not been conducted in the profession of athletic training. Athletic training does not have a body of comparative pedagogical research literature. Therefore, a study to compare the effectiveness of the case method of teaching with lecture method in the retention of athletic training knowledge is warranted.

CHAPTER III
METHODS

Subjects

Forty-two undergraduate students (female n = 25; male n =17) from a pool of sixty-six students majoring in athletic training at the same four year university volunteered for this study. Due to attrition, only thirty-six subjects (female n = 20; male n = 16) were studied. The average number of National Athletic Trainers Association (NATA) clinical hours among subjects was 303 ranging from zero to 1900 hours. It was explained to the students that participation was purely voluntary and their choice to volunteer or not volunteer would not be reflected in their grades. Subjects were told that the time spent volunteering could be counted as volunteer service hours which would be kept in their permanent academic files. Eight percent of the subjects elected to take this option. A sign-up sheet was posted outside the researcher's office to recruit subjects. The subjects were randomly assigned to one of four treatment conditions: case study (C), case study with discussion (CD), lecture (L), and lecture with discussion (LD). There were nine subjects assigned to each treatment condition. Approval was received by the Institutional Review Boards for the Protection of Human Subjects at the university that sponsored this dissertation and at the university that the subjects attended (see Appendix A).

Materials

Case study

Two case studies based on documented injury situations were created by the primary researcher. Both case studies were written to be interesting to the reader and at the same time provide key information on a specific athletic training topic.

The topics of the cases, orbital blow-out fracture and anaphylactic shock secondary to a bee sting, were chosen based on the National Athletic Trainer's Association's (NATA) list of athletic training competencies and the research subjects' knowledge of the topics. The evaluation and management of athletic injuries are competencies within performance domains that the NATA Board of Certification, Inc. (NATABOC) has determined an entry-level athletic trainer should possess (National Athletic Trainers' Association Board of Certification, Inc., 1991).

In order to benefit the subject's education, and to have relatively naive subjects for this study, orbital blow-out fracture and anaphylactic shock secondary to a bee sting were chosen as the injury topics. Previous to this study, subjects had received no formal instruction on orbital blow-out fractures or anaphylactic shock secondary to a bee sting in their athletic training education program. According to injury records, there had been no reported cases of orbital blow-out fractures or anaphylactic shock secondary to a bee sting in the athletic department during the time the subjects had been attending this four year institution. Therefore, the research subjects had very little knowledge of the injury topics prior to the study which could cause a history effect described by Thomas and Nelson (1985).

Case study one, orbital blow-out fracture (see Appendix B) is a three page case study based on a documented case reported by Forrest, Schuller, and Strauss (1989). The protocol used for the evaluation and management of the orbital blow-out fracture depicted in case study one was derived from protocols described in Erie (1991), Forrest et al. (1989), and Smith (1985). Case study two, anaphylactic shock (see Appendix B), is a four page case study based on a case reported by the American Red Cross (1991). The protocol used to evaluate and manage anaphylactic shock in case study two was derived from three sources: (American Academy of Orthopaedic Surgeons {AAOS}, 1981), (American Red Cross, 1991), and Arnheim and Prentice (1993).

Reliability and Validity

The evaluation and management protocols contained within the cases studies were written to reflect the current guidelines of evaluation and management that are expected of an athletic trainer who is certified by the NATABOC. To ensure that the case studies reflected these guidelines for injury evaluation and management, a ten member expert panel in the field of athletic training education was formed. A panel member was identified as an expert in athletic training education if they were a current director of a NATA approved athletic training education program. Five panel members were sent case study one and a letter (see Appendix C) that asked them to verify that the information contained within case study one reflected the current guidelines of injury evaluation and management expected of a certified athletic trainer. Five other panel members were sent case study two and a letter (see Appendix C) that asked them to verify that the information contained within case study two reflected the current guidelines of injury evaluation and management expected of

a certified athletic trainer. Panel members were asked to respond on a validation answer sheet (see Appendix D) provided by the researcher and to mail the answer sheet back to the researcher. Based on suggestions made by the panel members, minor changes in syntax and grammar were made to the case studies.

Lecture Script

Two lecture scripts were written to match the case studies in content and subject matter. Lecture script one, orbital blow-out fracture (see Appendix E), was written in outline form to contain the key points of evaluation and management of the orbital blow-out fracture found in case study one. The lecture script did not contain the background information and context that was included in the case study, only the specifics of evaluation and management of an orbital blow-out fracture.

Lecture script two, anaphylactic shock (see Appendix E), was written in outline form to contain the key points of evaluation and management of anaphylactic shock secondary to a bee sting found in case study two. The lecture script did not contain the background information and context that was included in the case study, only the specifics of evaluation and management of anaphylactic shock.

Lecture script one was sent with case study one to the first five member panel of experts on athletic training education. Lecture script two was sent with case study two to the second five member panel of experts on athletic training education. The members of the panels were asked to verify that the key points contained within the case studies were also contained in the accompanying lecture scripts. Panel members were asked to respond on a validation answer sheet (see Appendix D) provided

by the researcher and to mail the answer sheet back to the researcher. Based on suggestions made by the panel members, minor changes in syntax and grammar were made to the lecture scripts.

Discussion questions

Three questions were written reflecting the information contained within each case study and each lecture script. The questions were designed to stimulate discussion on the subject matter by the treatment groups. To ensure that the discussion questions reflected the information contained within the case studies and lecture scripts, the discussion questions were sent to the panel of experts on athletic training education. The discussion questions for orbital blow-out fracture (see Appendix F) were sent to the same five member panel of experts that received case study one and lecture script one. The discussion questions for anaphylactic shock (see Appendix F) were sent to the same five member panel of experts that received case study two and lecture script two. The panelists were asked to verify that the discussion questions arose logically from the injury topics. Panel members were asked to respond on a validation answer sheet
(see Appendix D) provided by the researcher and to mail the answer sheet back to the researcher. Based on the recommendations of the panel members, no changes in the discussion questions were made.

Post-test

To measure teaching method effectiveness, two multiple-choice examinations were written. Two answer sheets (see Appendix G) which corresponded to the exams were used for scoring.

Examination one, a 20 question multiple-choice examination with five response options, was written to test the key points contained in case study one and lecture script one (see Appendix H). Examination two, a 20 question multiple-choice examination with five response options, was written to test the key points contained in case study two and lecture script two (see Appendix H). Questions on both examinations were presented in a random order. To decrease the probability of a testing effect described by Thomas and Nelson (1985), questions and answers were re-randomized when the examinations were given to subjects a second time after a four week post-test delay.

The researcher used a multiple-choice examination due to its ease of administration, and the ability to objectively score the examination (Wiersma & Jurs, 1990). The researcher chose to use five response options instead of three or four to decrease the likelihood that subjects would guess the correct answer (Haladyna & Downing, 1985; Wiersma & Jurs, 1990).

The number of multiple-choice questions was based on the number of key points or concepts that were found in the case studies. Andre (1976, 1979, 1990) has demonstrated consistently that one question per concept is a sufficient measure for evaluating subject knowledge. Both case studies contained approximately 20 key points or concepts; one multiple-choice question was written for each concept.

Examination one, written for case study one and lecture script one, was sent to the five member panel of experts who received case study one, lecture script one and the accompanying discussion questions. The members of the panel were asked to verify that the multiple-choice examination questions could be answered from the information supplied in both the case study and the accompanying lecture script. Panel members were asked to respond on a validation answer sheet (see Appendix D) provided by the researcher and to mail

the answer sheet back to the researcher. Minor changes in syntax and grammar were made to the examinations based on the suggestions of the panel members.

Examination two, written for case study two and lecture script two, was sent to the five member panel of experts who received case study two, lecture script two and the accompanying discussion questions. Panel members were asked to respond on a validation answer sheet (see Appendix D) provided by the researcher and to mail the answer sheet back to the researcher.
Minor changes in syntax and grammar were made to the examinations based on the suggestions of the panel members.

History effect questionnaire

In order to determine if a history effect occurred during the span of the study, a two item questionnaire was created (see Appendix I). The questionnaire asked if the subjects had done anything to enhance their knowledge of the injury topics outside of the testing sessions and if so what they had done. The questionnaire also asked whether the subjects had discussed the research study with anyone other than the researcher.

Attitude Questionnaire

Four versions of a four item attitude questionnaire were created (see Appendix J) using a seven point Likert scale. The purpose of the questionnaire was to obtain a subjective measure of the subjects' level of learning on one of the injury topics. The questionnaire was administered after the subjects had taken the final examination in the study. The final examination covered the injury topic, anaphylactic shock so this was the injury topic chosen for the attitude questionnaire. Subjects were asked to rate from low to high, how well they felt

that they had learned the material with the specific teaching method employed in their treatment group. Subjects were then asked to to rate from how well they believed they would have learned the material had they been given each of the other teaching methods employed in this study.

Instrumentation

A stop watch was used to time the case study presentations, the lecture presentations, and the discussion period. Timing was conducted to ensure consistency in presentation length between treatment conditions. The discussion period was timed to determine how long each treatment group took to discuss each question.

A standard overhead projector was used to present the lecture scripts to the treatment groups. A new projector bulb was used for the duration of the study.

Procedures

Prior to the beginning of the study, subjects gave informed consent (see Appendix K). Subjects were verbally informed about the nature of the study and allowed to ask any questions regarding the study.

The thirty-six subjects for this experiment were randomly assigned to one of four treatment conditions: case study (C), case study with discussion (CD), lecture (L), and lecture with discussion (LD). Subjects were randomly assigned to one of the four treatment conditions. Randomization was accomplished by assigning each subject a number and then utilizing the table of random numbers from Kerlinger (1986, p. 640) for placement into a treatment condition.

In order to ensure unbiased examination scoring by the primary researcher and subject confidentiality, a research assistant coded each subject as they entered the first treatment session. The research assistant was a senior majoring in exercise science who had completed a beginning athletic training course the year before the study. The primary researcher trained the research assistant how to randomly assign codes to the subjects and how to code all of the study documents. Subject codes were used on all documents in place of subject names. The research assistant was the only one who knew which subject matched which code. This information was kept from the primary researcher until the end of the study.

Testing occurred in four separate sessions. In the first session, subjects were presented the injury topic, orbital blow-out fracture, and then immediately tested on the material. One week later, in the second session, subjects were presented the injury topic, anaphylactic shock, and then immediately tested on the material. The third session occurred four weeks after the first session. Subjects were given the same examination covering the injury topic, orbital blow-out fracture, only with a four week post-test delay. The fourth session occurred four weeks after the second session. Subjects were given the same examination covering the injury topic, anaphylactic shock, only with a four-week post-test delay. Studies conducted by Ebbinghaus in 1885 and Spitzer in 1939, showed that knowledge decay reaches its peak between 28 and 31 days (Horton & Turnage, 1976). Based on this research, an immediate post-test was administered and a four-week delayed post-test was administered. The design of the research is illustrated in Table 1 on page 43.

Table 1

Table of Research Design
(N=42)

Topic one Orbital Fx			Topic two Shock		
	Test time			Test time	
Method	Immediate	4-wks	Method	Immediate	4-wks
C	S's 1-9	S's 1-9	C	S's 1-9	S's 1-9
CD	S's 10-18	S's 10-18	CD	S's 10-18	S's 10-18
L	S's 19-27	S's 19-27	L	S's 19-27	S's 19-27
LD	S's 28-36	S's 28-36	LD	S's 28-36	S's 28-36

Note.
*Teaching methods are as follows:
C = Case study
CD = Case study with discussion
L = Lecture
LD = Lecture with discussion

^{o}n = 9 for each experimental condition

Each treatment group was assigned a treatment time and day based on subject and researcher availability. The same university classroom was used as the test site for all testing sessions.

When the lecture scripts were presented to the treatment groups, 18 point font size was used for ease of subject visualization. The lecture scripts were transferred to transparencies to be used on an overhead projector during the presentation.

Treatment condition one (C)

Testing session one

Upon arrival at the test site, subjects in treatment condition one, case study, were given a copy of case study one, orbital blow-out fracture, and told that they would be tested on the information contained in the case study. Subjects were instructed to read the case to themselves as the primary researcher read the case out loud to the subjects. Reading the case to themselves and hearing the case read out loud allowed the subjects to input the information both visually and auditorially as is the case during a lecture utilizing overhead transparencies. With a stop watch, the research assistant timed and recorded the length of the case presentation. The presentation was eight minutes long. This measurement was used to ensure consistency between treatment conditions in length of presentation of case study one.

After the case was read, subjects were given examination one, a 20 question multiple-choice examination on the key points of case study one. Subjects were not given a time limit to complete the examination. By using the wall clock in the classroom, subjects were asked to record on the exam the time they began the examination and the time they finished the examination. The researcher was interested in how much the student understood about the case, not how quickly he or she was able to answer the questions.

Upon completion of the examination, subjects were given a testing schedule (see Appendix L) and asked to return to the same location one week later at the same test time. To decrease the potential of a history effect described by Campbell and Stanley (1963), subjects were instructed not to enhance their knowledge of the injury topic during the span of the study.

Subjects were also instructed not to discuss the study with anyone other than the researcher.

Testing session two

Subjects met one week after the first testing session for testing session two. Upon entering the room, subjects were given the history effect questionnaire that asked if the subject had enhanced their knowledge of the injury topic outside of the testing sessions and whether they had discussed the research study with anyone other than the researcher. The research assistant collected the questionnaires and coded them.

The same procedure was followed in the second testing session as was followed in the first except subjects were given case study two, anaphylactic shock, instead of case study one. The research assistant timed the presentation and recorded its' length. The case study presentation was nine minutes long.

After the primary researcher read the case study to the subjects, subjects took examination two, a 20 question multiple-choice examination on the key points of case study two. There was no time limit placed on the examination, however, using the wall clock subjects were asked to record on their exam the time they began the examination and the time they finished the examination.

Upon completion of the examination, a testing schedule (see Appendix L) was given to the subjects. Subjects were asked to return to the same location four weeks from the date of the first testing session at the same test time. Subjects were reminded not to enhance their knowledge of either injury topic during the span of the study, and not to discuss the study with anyone other than the researcher.

Testing session three

Upon arrival at the testing site, four weeks after the first testing session, subjects were given the history effect questionnaire. The research assistant collected the questionnaires and coded them.

Subjects were again given examination one, the 20 question multiple-choice examination on case study one, orbital blow-out fracture. The questions and answers were re-randomized from the first testing session. Subjects were not given a time limit to complete the examination, however, they were asked to record on their exam the time they began the examination and the time they finished the examination.

Upon completion of the examination, subjects were given a testing schedule (see Appendix L). Subjects were asked to return to the same location one week later at the same test time. Subjects were reminded not to enhance their knowledge of either injury topic during the span of the study and not to discuss the study with anyone other than the researcher.

Testing session four

Four weeks after the second testing session, subjects were given the history effects questionnaire upon entering the test site. The research assistant collected the questionnaires and coded them.

Subjects were again given examination two, the 20 question multiple-choice examination on case study two, anaphylactic shock. The questions and answers were re-randomized from the second testing session. Subjects were not given a time limit to complete the examination, however, they were asked to record on their exam the time they began the examination and the time they finished the examination.

Upon completion of the examination, subjects were given the attitude questionnaire for the case study group. Subjects were thanked for their participation and instructed not to discuss the study with anyone other than the researcher. Subjects were informed that they would be given their examination scores and the correct answers to the examinations at the end of the study. Subjects were also informed that at the conclusion of the study, they could contact the primary researcher if they had any questions relative to the experiment.

Treatment condition two (CD)

Subjects in treatment condition two, case study with discussion, received the same treatment as subjects in treatment condition one except a discussion session was held between the presentation of the case study and the administration of the multiple-choice examination.

Testing session one

Upon arrival at the test site, the primary researcher presented case study one, orbital blow-out fracture to the treatment group. The presentation was eight minutes long. The primary researcher acted as a facilitator during the discussion. The facilitator continued the discussion until all relevant points pertaining to the discussion questions were covered. The research assistant timed each discussion question. All discussion questions lasted for six minutes.

At the end of the discussion period, subjects took examination one, the 20 question multiple-choice examination on the key concepts of case study one, orbital blow-out fracture. There was no limit on testing time, however, subjects

were asked to record on their exam the time they began the examination and the time they finished the examination.

Upon completion of the examination, a testing schedule (see Appendix L) was given to the subjects. Subjects were asked to return to the same location one week later at the same test time. Subjects were reminded not to enhance their knowledge of the injury topic during the span of the study, and not to discuss the study with anyone other than the researcher.

Testing session two

Subjects met one week after the first testing session. Subjects were given a history effect questionnaire that asked if they had enhanced their knowledge of the injury topic outside of the testing sessions and whether they had discussed the study with anyone other than the researcher. The research assistant collected the questionnaires and coded them.

Aside from the administration of the questionnaire, the same procedure was followed in the second testing session as was followed in the first except subjects were given case study two, anaphylactic shock, instead of case study one.

The primary researcher presented case study two, anaphylactic shock. The research assistant timed and recorded the length of the case study presentation. The presentation was eight and one half minutes long.

After the case study presentation, the primary researcher asked the treatment group three discussion questions pertaining to case study two. The primary researcher acted as a facilitator during the discussion. The facilitator continued the discussion until all relevant points pertaining to the discussion questions were covered. The research assistant timed each discussion question.

Question one was discussed for seven minutes. Question two was discussed for seven minutes. Question three was discussed for five minutes.

At the end of the discussion period, subjects took examination two, the 20 question multiple-choice examination on the key concepts of case study two, anaphylactic shock. There was no limit on testing time, however, subjects were asked to record on their exam the time they began the examination and the time they finished the examination.

Upon completion of the examination, a testing schedule (see Appendix L) was given to the subjects. Subjects were asked to return to the same location four weeks from the date of the first testing session at the same test time. Subjects were reminded not to enhance their knowledge of either injury topic during the span of the study, and not to discuss the study with anyone other than the researcher.

Testing session three

Testing session three was the same as in treatment condition one except subjects were given a different testing schedule upon completion of the examination (see Appendix L).

Testing session four

Testing session four was the same as in treatment condition one except subjects were given a different testing schedule upon completion of the examination (see Appendix L).

Treatment condition three (L)

Subjects in treatment condition three, lecture, received the same treatment as subjects in treatment condition one except the key points and concepts of case study one, orbital blow-out fracture, were presented utilizing a traditional lecture format.

Testing session one

Upon arrival at the test site, each subject was given a blank note pad and pencil. Subjects were instructed to listen to the lecture presentation and to take notes on the presentation as they would normally do during a class period. Subjects were told that they would be tested on the information covered in the lecture.

The primary researcher presented lecture one, orbital blow-out fracture. The research assistant timed and recorded the length of the lecture presentation. The presentation was twelve minutes long.

When the lecture ended, the note pads were collected and subjects were given examination one, the 20 question multiple choice examination on the key points of lecture script one, orbital blow-out fracture. Subjects were not given a time limit to complete the examination, however, they were asked to record on their exams the time they began the examination and the time they concluded the examination.

Upon completion of the examination, a testing schedule (see Appendix L) was given to the subjects. Subjects were asked to return to the same location one week later at the same test time. Subjects were reminded not to enhance their knowledge of the injury topic during the span of the study, and not to discuss the study with anyone other than the researcher.

Testing session two

Subjects met one week after the first testing session. Subjects were given the history effect questionnaire that asked if they had enhanced their knowledge of the injury topic outside of the testing sessions and whether they had discussed the study with anyone other than the researcher. The research assistant collected the questionnaires and coded them.

Aside from the questionnaire, the same procedure was followed in the second testing session as was followed in the first except subjects were presented lecture two, anaphylactic shock, instead of lecture one. The research assistant timed the presentation and recorded its length. The lecture presentation was sixteen minutes long.

After the primary researcher presented the lecture to the subjects, subjects took examination two, a 20 question multiple-choice examination on the key points of lecture two, anaphylactic shock. There was no time limit placed on the examination, however, they were asked to record on their exams the time they began the examination and the time they concluded the examination.

Upon completion of the examination, a testing schedule (see Appendix L) was given to the subjects. Subjects were asked to return to the same location four weeks from the date of the first testing session at the same test time. Subjects were reminded not to enhance their knowledge of either injury topic during the span of the study, and not to discuss the study with anyone other than the researcher.

Testing session three

Testing session three was the same as in treatment condition one except subjects were given a different testing schedule upon completion of the examination (see Appendix L).

Testing sesion four

Testing session four was the same as in treatment condition one except subjects were given a different testing schedule upon completion of the examination (see Appendix L).

Treatment condition four (LD)

Subjects in treatment condition four, lecture with discussion, received the same treatment as subjects in treatment condition three except a discussion session was held between the presentation of the lecture and the administration of the multiple-choice examination.

Testing session one

Upon arrival at the test site, each subject was given a blank note pad and pencil. Subjects were instructed to listen to the lecture presentation and to take notes on the presentation as they would normally do during a class period. Subjects were told that they would be tested on the information covered in the lecture.

The primary researcher presented lecture one, orbital blow-out fracture. The research assistant timed and recorded the length of the lecture presentation. The presentation was twelve minutes long.

After subjects were presented lecture one, orbital blow-out fracture, the note pads were collected. The primary researcher asked the treatment group three discussion questions pertaining to lecture one. The primary researcher acted as a facilitator during the discussion. The facilitator continued the discussion until all relevant points pertaining to the discussion questions were covered. The research assistant timed each discussion question. Question one was discussed for six and one-half minutes. Question two was discussed for five and one-half minutes. Question three was discussed for six and one-half minutes. At the end of the discussion period, subjects were given examination one, the 20 question multiple-choice examination on the key concepts of lecture one. There was no limit on testing time, however, subjects were asked to record on their exams the time they began the examination and the time they finished the examination.

Upon completion of the examination, subjects were given a testing schedule (see Appendix L). Subjects were asked to return to the same location one week later at the same test time. Subjects were reminded not to enhance their knowledge of the injury topic during the span of the study and not to discuss the study with anyone other than the researcher.

Testing session two

Subjects met one week after the first testing session. Subjects were given the history effect questionnaire that asked if the subject had enhanced his or her knowledge of the injury topic outside of the testing sessions and whether he or

she had discussed the study with anyone other than the researcher. The research assistant collected the questionnaires and coded them.

Aside from the questionnaire, the same procedure was followed in the second testing session as was followed in the first except the primary researcher presented lecture two, anaphylactic shock, instead of lecture one to the treatment group. With a stop watch, the research assistant timed and recorded the length of the lecture presentation. The presentation was sixteen minutes long.

After subjects were presented lecture two, anaphylactic shock, the note pads were collected. The primary researcher asked the treatment group three discussion questions pertaining to lecture two. The primary researcher acted as a facilitator during the discussion. The facilitator continued the discussion until all relevant points pertaining to the discussion questions were covered. The research assistant timed each discussion question. Question one was discussed for eight minutes. Question two was discussed for three and one-half minutes. Question three was discussed for five minutes. At the end of the discussion period, subjects were given examination two, the 20 question multiple-choice examination on the key concepts of lecture two. There was no limit on testing time, however, subjects were asked to record on their exams the time they began the examination and the time they finished the examination.

Upon completion of the examination, subjects were given a testing schedule (see Appendix L). Subjects were asked to return to the same location four weeks after the first testing session at the same test time. Subjects were reminded not to enhance their knowledge of either injury topic during the span of the study and not to discuss the study with anyone other than the researcher.

Testing session three

Testing session three was the same as in treatment condition one except subjects were given a different testing schedule upon completion of the examination (see Appendix L).

Testing session four

Testing session four was the same as in treatment condition one except subjects were given a different testing schedule upon completion of the examination (see Appendix L).

Design and Analysis

The experimental design used was a 4x2x2 (teaching method x injury topic x test time) factorial design with repeated measures on the last two factors. The between subjects factor, teaching method, had four levels: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD). The first within-subjects factor, injury topic, had two levels: orbital blow-out fracture and anaphylactic shock secondary to a bee sting. The second within-subjects factor, test time, had two levels: immediate post-test and four-week delayed post-test.

A 4x2x2 multivariate analysis of variance (MANOVA) with repeated measures was performed on the multiple-choice examination scores which were the dependent variable. Data were analyzed using Subprograms MANOVA for repeated measures, WS FACTORS, and MWITHIN from the Statistical Package for the Social Sciences (Nie, Hull, Jenkins, Steinbrenner, & Bent, 1975). The multiple analysis of variance statistical procedure with repeated measures (Subprogram MANOVA for repeated measures, Nie et al., 1975) was used to

determine significant treatment effects. An alpha level of .05 was used to determine significance. Descriptive statistics (Subprogram CONDESCRIPTIVE, Nie et al., 1975) were also computed.

A seven point Likert scale from low to high was constructed to test the subject's attitude toward the teaching methods. NPAR was the SPSS Subprogram utilized to perform a Kruskal-Wallis one way analysis of variance test on the attitude data (Nie, et al., 1975). Response percentages for the attitude questions were generated utilizing the SPSS Subprogram FREQUENCIES (Nie, et al., 1975).

CHAPTER IV
RESULTS

The main question of interest in this study was the comparative effectiveness of four teaching methods on the retention of athletic training knowledge. In order to study this question, forty-two subjects were randomly assigned to one of four treatment conditions. Data were analyzed on thirty-six subjects. Four subjects did not complete the study due to attrition. while two subjects were eliminated based upon the results of the history effect questionnaire indicating that they had increased their knowledge on the injury topics outside the testing sessions. The result of this random subject attrition was an even number of subjects per treatment condition, (i.e., nine subjects per treatment condition). The second question of interest was the difference in the attitude of subjects regarding the teaching method that they were assigned.

The findings of this study are presented under the following headings: (a) Examination of Data and Statistical Assumptions, (b) Examination of Hypotheses, and (c) Summary of Hypotheses Decisions.

Examination of Data and Statistical Assumptions

Subprograms CONDESCRIPTIVE, FREQUENCIES, and MANOVA from Statistical Package for the Social Sciences (SPSS) was first used to examine the raw experimental data and to determine if the assumptions for using the multivariate analysis of variance (MANOVA) procedures were met (Nie et al., 1975). According to Tabachnick and Fidell (1983), the assumptions for using MANOVA are normality, linearity, homoscedasticity, multicollinearity, singularity, and sphericity. Results of the initial raw data analysis showed that the assumptions for using the MANOVA procedure were met.

Examination of the Hypotheses

The main experimental data utilized a 4x2x2 (teaching method x injury topic x test time) MANOVA with repeated measures on the last two factors to examine each hypothesis at the .05 level of significance. As part of the MANOVA procedure, subsequent univariate F tests were conducted to examine each dependent variable.

The attitude data was analyzed with a Kruskal Wallis one way analysis of variance to examine the hypothesis concerning the attitude data at the .05 level of significance. The results of both analysis are presented in the order of the hypothesis tested.

Hypothesis one

The first hypothesis stated that there was no significant difference among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD). Results of the 4x2x2 (teaching method x injury topic x test time) MANOVA with repeated measures on the last two factors showed no overall significant difference between teaching methods $F(3) = 1.11$, $p = .360$. The MANOVA summary information is presented in Table 2 on page 59.

Table 2

Multivariate Analysis of Variance Summary Table

Source	SS	df	MS	F	p
Teaching Method	19.69	3	6.56	1.11	.360
Injury Topic	361.00	1	361.00	85.64	.000*
Method X Topic	18.61	3	6.20	1.47	.241
Test Time	113.78	1	113.78	28.37	.000*
Method X Time	40.39	3	13.46	3.36	.031*
Topic X Time	2.25	32	2.25	1.14	.294
Method X Topic X Time	4.92	3	1.64	.83	.488
Total	560.64	46	504.89		

* $p < .05$.

Hypothesis two

The second hypothesis stated that there was no significant difference between injury topics: orbital blow-out fracture and anaphylactic shock secondary to a bee sting. Results of the 4x2x2 (teaching method x injury topic x test time) MANOVA with repeated measures on the last two factors showed a significant difference between injury topic $F(1) = 85.64$, $p = .000$. This statistical information is shown in Table 2 above. Inspection of the means for these two topics showed the average means for the groups with topic one (15.06 test one, 13.06 test two) to be lower than the average means for the groups with topic two (18.00 test one, 16.47 test two). Means and standard deviations for the four treatment groups are illustrated in Table 3 on page 60.

Table 3

Test Score Means and Standard Deviations

	Topic 1				Topic 2			
	Test 1		Test 2		Test 1		Test 2	
Group*	M	SD	M	SD	M	SD	M	SD
C	15.89	2.15	12.67	2.82	18.11	1.45	16.33	2.50
CD	14.89	2.47	13.22	2.22	19.22	0.83	17.33	1.32
L	15.77	1.86	13.11	1.76	18.11	0.93	15.22	1.98
LD	13.78	2.38	13.22	2.05	16.56	2.30	17.00	1.87
TOTAL	15.06	2.22	13.06	2.21	18.00	1.38	16.47	1.92

Note.

*Teaching methods are as follows:
C = Case study
CD = Case study with discussion
L = Lecture
LD = Lecture with discussion

^{9}n = 9 for each experimental condition

Hypothesis three

The third hypothesis stated that there was no significant difference between the two testing times: immediate post-test and four week delay post-test. Results of the 4x2x2 (teaching method x injury topic x test time) MANOVA with repeated measures on the last two factors showed a significant difference between testing times $F(1) = 28.37$, $p = .000$. This statistical information is shown in Table 2 on page 59. Analysis of the means illustrated in Table 3 above show test score means for immediate post test (15.06 for topic one, 18.00 for topic two) to be higher than the test score means for the four week delay post test (13.06 for topic one, 16.47 for topic two).

Hypothesis four

The fourth hypothesis stated that there was no significant interaction effect among teaching method by test time. Results of the 4x2x2 (teaching method x injury topic x test time) MANOVA with repeated measures on the last two factors showed a significant interaction effect between teaching method by test time $F(3) = 3.36$, $p = .031$. This statistical information is shown in Table 2 on page 59. Subsequent univariate F test analysis to show simple effects was performed which demonstrated a significant interaction effect of teaching methods one (case) $F(1) = 14.03$, $p = .001$, two (case with discussion) $F(1) = 7.09$, $p = .012$, and three (lecture) $F(1) = 17.32$, $p = .000$ by test time. There was no significant interaction effect shown for teaching method four (lecture with discussion) by test time $F(1) = .01$, $p = .934$. The univariate statistical information is shown in Table 4 on page 62.

Table 4

Unvariate F tests of Method by Time

Source	SS	df	MS	F	p
Method 1(C) X Time	56.25	1	56.25	14.03	.001*
Method 2 (CD) X Time	28.44	1	28.44	7.09	.012*
Method 3(L) X Time	69.44	1	69.44	17.32	.000*
Method 4(LD) X Time	.03	1	.03	.01	.934
Total	154.16	4	154.16		

* $p < .05$

Hypothesis five

The fifth hypothesis stated that there was no significant interaction effect among teaching method by injury topic. Results of the 4x2x2 (teaching method x injury topic x test time) MANOVA with repeated measures on the last two factors showed no significant interaction effect between teaching method by injury topic $F(3) = 1.47$, $p = .241$. This statistical information is shown in Table 2 on page 59.

Hypothesis six

The sixth hypothesis stated that there was no significant interaction effect between injury topic by test time. Results of the 4x2x2 (teaching method x injury topic x test time) MANOVA with repeated measures on the last two factors

showed no significant interaction effect between injury topic by test time $F(32) = 1.14$, $p = .294$. This statistical information is shown in Table 2 on page 59.

Hypothesis seven

The seventh hypothesis stated that there was no significant overall interaction effect among teaching method by injury topic by test time. Results of the 4x2x2 (teaching method x injury topic x test time) MANOVA with repeated measures on the last two factors showed no significant interaction effect between teaching method by injury topic by test time $F(3) = .83$, $p = .488$. This statistical information is shown in Table 2 on page 59.

Hypothesis eight

The eighth hypothesis in this study concerned results of the attitude questionnaire. The hypothesis stated that there was no significant difference among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD) in their attitudes towards the method of teaching the injury topic anaphylactic shock secondary to a bee sting. Because the attitude questionnaire consisted of four versions of a four item questionnaire only the first question (... How well do you think you learned the material with this method?), which was common to all groups could be statistically analyzed. Results of the Kruskal-Wallis one way analysis of variance showed no significant difference between teaching method on the first attitude question; chi square(3)= 3.23 $p = .3574$. The frequency of responses for all attitude questions were analyzed and are presented in Table 5 on page 65. For the purpose of clarity, on the 7 point scale responses one through three were considered low and responses five through seven were considered high

with response four not included in the analysis. For treatment group one, case study (C), of the responses to question one (... How well do you think you learned the material with this method?), 88% were high and 12% were low. For question two (...how well do you think you would have learned with case study and discussion?), 100% were high. For question three (... how well do you think you would have learned with lecture?), 100% were high. For question four (... how well do you think you would have learned with lecture with discussion?), 100% of the responses were high.

For treatment group two, case study with discussion (CD), of the responses to question one (... How well do you think you learned the material with this method?), 100% were high. For question two (...how well do you think you would have learned without discussion?), 29% were high and 71% were low. For question three (... how well do you think you would have learned with lecture method?), 100% were high. For question four (... how well do you think you would have learned with lecture and discussion?), 100% of the responses were high.

For treatment group three, lecture (L), 100% of the responses to question one (... How well do you think you learned the material with this method?), were high. For question two (...how well do you think you would have learned with lecture and discussion?), 100% were high. For question three (... how well do you think you would have learned with case study method?), 83% were high and 17% were low. For question four (... how well do you think you would have learned with lecture and discussion?), 100% of the responses were high.

For treatment group four, lecture with discussion (LD), 88% of the responses to question one (... How well do you think you learned the material with this method?), were high and 12% were low. For question two (...how well do you think you would have learned without discussion?), 100% were low. For

question three (... how well do you think you would have learned with case study method?), 50% were high and 50% were low. For question four (... how well do you think you would have learned with case and discussion?), 100% of the responses were high. The attitude questionnaires with the complete questions are located in Appendix J.

Table 5

Frequency of Responses for Attitude Questions
(N=36)

Question	1		2		3		4	
			Responses					
Group[o]	LOW	HI	LOW	HI	LOW	HI	LOW	HI
C	12%	88%	0%	100%	0%	100%	0%	100%
CD	0%	100%	71%	29%	0%	100%	0%	100%
L	0%	100%	0%	100%	17%	83%	0%	100%
LD	12%	88%	100%	0%	50%	50%	0%	100%

Note.

[o]Teaching methods are as follows:
C = Case study
CD = Case study with discussion
L = Lecture
LD = Lecture with discussion

Summary of Hypotheses Decisions

The following information is a listing of the hypotheses used in this investigation and the statistical decisions that were reached regarding these hypotheses examined at the .05 level of significance:

1. There is no significant difference among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD) in the performance of athletic training students on a multiple

choice examination over two injury topics: orbital blow out fracture and anaphylactic shock secondary to a bee sting. **ACCEPTED.**

2. There is no significant difference among the injury topics, orbital blow out fracture and anaphylactic shock secondary to a bee sting, in the performance of athletic training students on a multiple choice examination. **REJECTED.**

3. There is no significant difference among testing times, immediate post- test and four week delay post- test, on the performance of athletic training students on a multiple choice examination over two injury topics, orbital blow-out fracture and anaphylactic shock secondary to a bee sting. **REJECTED.**

4. There is no significant interaction effect among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD) by test time: immediate post- test, four week delay post- test in the performance of athletic training students on a multiple choice examination over two injury topics, orbital blow-out fracture and anaphylactic shock secondary to a bee sting. **REJECTED.**

5. There is no significant interaction effect among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion by injury topic: orbital blow-out fracture, anaphylactic shock secondary to a bee sting in the performance of athletic training students on a multiple choice examination at two test times. **ACCEPTED.**

6. There is no significant interaction effect between injury topic, orbital blow-out fracture, and anaphylactic shock secondary to a bee sting, by test time, immediate post- test and four week delay post- test in the performance of four groups of athletic training students on a multiple choice examination. **ACCEPTED.**

7. There is no significant overall interaction effect of teaching method by injury topic x test time in the performance of athletic training students on a multiple choice examination. **ACCEPTED.**

8. There is no significant difference among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD) on the attitude of athletic training students regarding the method of teaching the injury topic anaphylactic shock secondary to a bee sting. **ACCEPTED.**

CHAPTER V
CONCLUSIONS

From the time the case based method of teaching began at the Harvard Law School, this method of teaching has been used extensively in professional education programs to enhance knowledge retention and bridge the gap between the classroom and real life. However, controlled experimental research to study the effectiveness of this teaching method is limited and what does exist is inconclusive. The majority of the case method literature is devoted to the professions of business, education, and medicine. There is no comparative pedagogical research in the athletic training profession. Due to the fact that the existing case method research is equivocal and there exists no comparative pedagogical research in athletic training, a study designed to compare the use of the case based method of teaching with lecture method in athletic training is needed.

Summary

The primary purpose of this investigation was to compare the effectiveness of the case based method of teaching to traditional lecture in the retention of athletic training knowledge with group discussion included in both methods. A secondary purpose was to obtain a subjective measure of the subjects' levels of learning through the use of an attitude questionnaire. Teaching method effectiveness was measured by the use of a 20 question multiple-choice examination covering two athletic training injury topics, orbital blow-out fracture and anaphylactic shock secondary to a bee sting. Retention was tested with the use of an immediate post-test and a four week delayed post-test.

Volunteers for this study were forty-two (female $\underline{n}$ = 25; male $\underline{n}$ = 17) undergraduate students who were athletic training majors at the same four year university. Due to attrition and the results of history effect questionnaires, data on thirty-six subjects (female $\underline{n}$ = 20; male $\underline{n}$ = 16) were analyzed. The subjects were randomly assigned to one of four treatment conditions: case study (C), case study with discussion (CD), lecture (L), and lecture with discussion (LD). There were nine subjects assigned to each treatment condition.

The main experimental data were analyzed using a 4 x 2 x 2 (teaching method x injury topic x test time) MANOVA with repeated measures on the second and third factors. This analysis was applied to the multiple-choice examination scores given immediately after treatment and four weeks later. As part of the MANOVA procedure, subsequent univariate F tests were conducted to examine each dependent variable.

The attitude data utilized the Kruskal Wallis one way analysis of variance to examine the hypotheses concerning the attitude data. The results of this investigation were presented in order according to the hypothesis tested at the .05 level of significance.

Hypothesis one stated that there was no significant difference among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD). MANOVA results indicated that there was no statistically significant difference among teaching methods on an examination of athletic training knowledge over two injury topics at two different testing times $\underline{F}(3) = 1.11$, $\underline{p} = .360$.

Hypothesis two stated that there was no significant difference between injury topics, orbital blow-out fracture and anaphylactic shock secondary to a bee sting. MANOVA results showed a significant difference between injury topic $\underline{F}(1) = 85.64$, $\underline{p} = .000$. Inspection of the means for these two topics showed that

subjects performed higher on the multiple-choice examinations over anaphylactic shock then on the examinations over orbital blow-out fracture. Average means for the groups with orbital blow-out fracture were: 15.06 immediate post-test, 13.06 four week delayed post-test, compared with: 18.00 immediate post-test, 16.47 delayed post-test, for anaphylactic shock.

Hypothesis three stated that there was no significant difference between the two testing times: immediate post-test and four week delay post-test. MANOVA results showed a significant difference between testing times $F(1) = 28.37$, $p = .000$. Analysis of the means indicated that subjects scored higher on the immediate post-test compared with a post-test taken four weeks later. Test score means for the immediate post-test were: 15.06 for orbital blow-out fracture and 18.00 for anaphylactic shock, compared with: 13.06 for orbital blow-out fracture and 16.47 for anaphylactic shock with the four week delayed post-test.

Hypothesis four stated that there was no significant interaction effect among teaching method by test time. MANOVA results showed a significant interaction effect among teaching method by test time $F(3) = 3.36$, $p = .031$. Subsequent univariate F test analysis to show simple effects indicated a significant interaction effect of teaching methods one (case) $F(1) = 14.03$, $p = .001$, two (case with discussion) $F(1) = 7.09$, $p = .012$, and three (lecture) $F(1) = 17.32$, $p = .000$ by test time. There was no significant interaction effect shown for teaching method four (lecture with discussion) by test time $F(1) = .01$, $p = .934$. Subjects in teaching methods one, two, and three did significantly better on the immediate post-test than on the four week delayed post-test. Subjects in teaching method four (lecture with discussion) showed no significant difference in scores on a multiple-choice examination between the immediate post-test and the four week delayed post-test.

Hypothesis five stated that there was no significant interaction effect among teaching method: case (C), case with discussion (CD), lecture (L) and lecture with discussion (LD) by injury topic: orbital blow-out fracture and anaphylactic shock. MANOVA results showed no significant interaction effect between teaching method by injury topic $F(3) = 1.47$, $p = .241$. Scores on the multiple-choice examinations were higher for anaphylactic shock than for orbital blow out fracture across all teaching methods.

Hypothesis six stated that there was no significant interaction effect between injury topic: orbital blow out fracture and anaphylactic shock secondary to a bee sting, by test time: immediate post-test and four week delay post-test. MANOVA results showed no significant interaction effect between injury topic by test time $F(32) = 1.14$, $p = .294$. Regardless of the injury topic, subjects scored lower on the four week delayed post-test than on the immediate post-test.

Hypothesis seven stated that there was no significant overall interaction effect of teaching method by injury topic by test time. MANOVA results showed no overall significant interaction effect of teaching method by injury topic by test time $F(3) = .83$, $p = .488$. This finding indicates no overall significant differences among teaching method on the multiple-choice examination scores.

Hypothesis eight stated that there was no significant difference among the four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD) on the attitude of athletic training students regarding the method of teaching the injury topic anaphylactic shock secondary to a bee sting. Because the attitude questionnaire consisted of four versions of a four item questionnaire only the first question (... How well do you think you learned the material with this method?), which was common to all groups could be statistically analyzed. Results of the Kruskal-Wallis one way analysis of variance showed no significant difference between teaching method on the first attitude

question; chi square(3)= 3.23, p = .3574. In all the teaching methods, subjects ranked the amount they had learned on the topic anaphylactic shock as high: 88% for case method, 100% for case with discussion, 100% for lecture and 88% for lecture with discussion.

The second attitude question asked how well the subjects thought they would have learned if discussion was added to the case and lecture groups, and if it was deleted from the case with discussion and lecture with discussion groups. The groups without discussion ranked the amount of learning that would have occurred as high with discussion (100% for case and 100% for lecture). The groups with discussion ranked the amount of learning that would have occurred without it as low (71% case with discussion and 100% lecture with discussion).

The third attitude question asked how well the subjects thought they would have learned if they had been given the lecture method instead of the case method in group one (C), the lecture method instead of the case with discussion method in group two (CD), the case method instead of the lecture method in group three (L), and the case method instead of the lecture with discussion method in group four (LD). Subjects in groups one (C), two (CD) and three (L) ranked the amount they would have learned with the other teaching method as high (100% for case, 100% for case with discussion and 83% for lecture). Fifty percent of the subjects in group four (LD) ranked the amount they thought they would have learned with the case method and discussion as low and 50% ranked the amount as high.

The fourth attitude question asked subjects how well they thought they would have learned if they had been given lecture with discussion instead of the case method for group one (C), the lecture method with discussion instead of the case with discussion method for group two (CD), the case method with discussion instead of the lecture method for group three (L), and the case

method with discussion instead of the lecture method with discussion for group four (LD). Subjects in all groups ranked the amount of learning that would have occurred as high if they had been given the other teaching method (100% for case, 100% for case with discussion, 100% for lecture, and 100% for lecture with discussion).

Discussion

The findings in this investigation support the comparative research literature that found there is no significant difference between the effectiveness of the case based method of teaching and the traditional lecture method of teaching on tests of knowledge and achievement. Specifically, athletic training majors who were assigned to either a case group (C), a case with discussion group (CD), a lecture group (L), or a lecture with discussion group (LD), did not perform significantly different on the multiple-choice examinations over two injury topics. These findings in athletic training support previous research in education that compared the case method of teaching with traditional lecture method of teaching (Butler, 1966; James, 1991; Kleinfeld, 1991; Tillman, 1993). The present investigation was the first attempt to compare the effectiveness of different teaching methods in athletic training.

The findings in this study revealed that athletic training majors across all treatment groups: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD), performed significantly better on a multiple-choice examination over orbital blow out fracture compared with a multiple-choice examination over anaphylactic shock secondary to a bee sting. The most obvious explanation for these significant differences can be attributed to the previous knowledge that the subjects possessed regarding these injury topics. Although subjects were naive to the topic anaphylactic shock secondary to a bee

sting, they were not naive to the general topic of shock. Signs and symptoms of shock is a common topic in beginning athletic training coursework which all of the research subjects had taken. Therefore, it is believed that subjects possessed previous knowledge over the topic anaphylactic shock but not over orbital blow-out fracture. Even with the observed performance difference between injury topic, there was no significant difference among teaching method with either orbital blow-out fracture or anaphylactic shock secondary to a bee sting.

Another consideration in this investigation was retention of athletic training knowledge. Ebbinghaus in 1885 and Spitzer in 1939, showed that knowledge decay reaches its peak between 28 and 31 days (Horton & Turnage, 1976). Therefore, a post-test of athletic training knowledge was administered immediately after the treatment condition and then 28 days or four weeks later. The literature that compared the case method of teaching to traditional lecture method utilized pre-test and post-test designs (Butler, 1966; James, 1991; Kleinfeld, 1991; Tillman, 1993). Retention studies were not conducted since no post-test, post-test designs were employed. There are anecdotal claims that the case method of teaching is more effective than the lecture method of teaching in enhancing knowledge retention (Neufield, 1974; Leenders & Erskine, 1978). This investigation, however, does not support these anecdotal claims. When teaching method was not a factor in the analysis, this investigation found a significant difference between the immediate post-tests and the four-week delayed post-test over both injury topics. Considering the knowledge decay literature, these results would be expected. However, when teaching method was a factor, the results of this study indicated that lecture with discussion (LD) was the only group that did not suffer knowledge decay over the period of time between the immediate post-tests and the four week delayed post-tests. Scores on the immediate post-tests and the four week delayed post-tests were significantly different for the case (C),

case with discussion (CD), and lecture (L) groups with each group scoring lower on the four week delayed post-tests. The lecture with discussion treatment group (LD), did not show a significant difference between the two test times. The lecture with discussion group, therefore, retained the information better than the case (C), case with discussion (CD), or lecture (L) groups . According to Christensen et al., part of the success of any teaching method is its ability to enhance knowledge retention in the learner (1991). Therefore, in this investigation, lecture with discussion was the more successful teaching technique.

Discussion was another consideration in this study. A variety of authors have asserted that discussion is a critical element in the success of the case method of teaching (Christensen & Hansen, 1987; Silverman, Welty & Lyon, 1992). Results of this investigation do not support this non researched claim. There was no significant difference shown between the case method with discussion and without or the lecture method with discussion and without. To further investigate the contribution of discussion in the case method of teaching, the researcher compared the discussion times of the case with discussion (CD) and lecture with discussion (LD) groups. The discussion groups were given three questions based on each injury topic to discuss. The case with discussion group took six minutes to discuss each of the three questions pertaining to orbital blow out fracture, whereas the lecture with discussion group, took six and one-half minutes, five and one-half minutes, and six and one-half minutes to discuss questions one, two, and three. For the discussion questions pertaining to anaphylactic shock, the case with discussion group took seven minutes, seven minutes, and five minutes to discuss the three questions. The lecture with discussion group took eight minutes, three and one-half minutes and five minutes to discuss the questions pertaining to anaphylactic shock. The only major

discrepancy in discussion time occurred in question two on anaphylactic shock (Many athletes are stung by bees. When and how should an athletic trainer treat a bee sting and when should EMS be activated?). The case with discussion group took seven minutes and the lecture with discussion group only took three and one-half minutes to discuss the question. The shorter amount of time that was used by the lecture with discussion group to answer this question was not due to speed or efficiency in answering. The author observed that the lecture with discussion group was not progressing in their discussion of this question so she moved on to the next question. If discussion was a critical element of the case method of teaching, the lecture with discussion group should have done worse than the case with discussion group on the multiple-choice examinations due to the decreased discussion time. This was not the case. The only difference found among groups was the apparent enhanced retention of the lecture with discussion group compared with the other teaching methods. Therefore, even with less time spent in discussion, the lecture with discussion group showed no knowledge decay between the immediate post-tests and the four week delayed post-tests.

The final consideration in this investigation was a subjective measurement of level of learning utilizing an attitude questionnaire. Specifically, subjects were asked to rate, on a scale of one to seven, how much they thought they learned about the injury topic anaphylactic shock secondary to a bee sting. Subjects were then asked to rate how well they thought they would have learned if given the other teaching methods in the study. The results of the statistical analysis of the first attitude question agreed with the findings of Kleinfeld (1991) and Tillman (1993) who saw no difference between case study method and lecture method in subjects' attitudes. However, this investigation did not support the findings of Butler (1966) and James (1991) who found subjects' attitudes to be more positive

with the case method than with the lecture method. Comparing the results of the attitude survey employed in this study to those employed in the other studies may not be accurate. The previous educational research comparing subjects' attitudes with the case method to the lecture method of teaching asked subjects questions pertaining to enjoyment and instructor effectiveness. The attitude questionnaire in this study only asked subjects questions pertaining to level of learning. Also, in all of the previous research studies, more than one attitude question was statistically analyzed.

Although only the first attitude question was statistically analyzed, an inspection of the remaining responses yielded some interesting results. One hundred percent of the subjects across all treatment groups ranked the amount they thought they would have learned with the lecture and discussion method as high compared to their own teaching method rankings of 88% for case (C), 100% for case with discussion (CD), and 100% for lecture (L). Eighty-eight percent of the subjects in the lecture with discussion group (LD) ranked the amount they learned with this teaching method as high. One hundred percent of the subjects in the case (C) and case with discussion (CD) groups ranked the amount they would have learned with the lecture method alone as high. So although subjects ranked the amount of learning as high, they ranked the amount they would have learned with the lecture and lecture with discussion methods as high or higher. One possible explanation for these results is a cited weakness of the case method. Christensen and Hansen stated, in 1987, that students may feel uncomfortable with the case method of teaching if they were not familiar with it. None of the subjects in this study were familiar with the case method of teaching. Therefore, subjects in the case method groups may have ranked lecture and lecture with discussion higher because they felt more comfortable with it. The

subjects were accustomed to a teaching format with lecture and lecture with discussion.

In summary, the results of this study do not support the use of the case based method of teaching in order to enhance the retention of athletic training students' knowledge of the injury topics orbital blow-out fracture, and anaphylactic shock secondary to a bee sting. Also, due to the labor intensity of writing a case study and the relative unfamiliarity of students' with the case method (Christensen & Hansen, 1987), this investigator can not recommend its use for enhancing retention of athletic training knowledge. In this investigation, lecture with discussion (LD) was shown to enhance the retention of athletic training knowledge compared to the case (C), case with discussion (CD), and lecture (L) methods of teaching two injury topics. Until further research is conducted to study the effectiveness of the case based method of teaching in the profession of athletic training, it is prudent to state that the lecture with discussion method of teaching continues to be an effective method of conveying athletic training knowledge.

Conclusion

Within the scope and limitations of this investigation, the following conclusion is drawn:

Based on the findings of this investigation, it can be concluded that there is no significant difference among four teaching methods: case (C), case with discussion (CD), lecture (L), and lecture with discussion (LD) in athletic training students' performance on a multiple-choice examination of athletic training knowledge over two injury topics: orbital blow out fracture and anaphylactic shock secondary to a bee sting. An interaction effect of teaching method by test

time showed no significant difference in performance between an immediate post-test and a four week delayed post-test with the lecture and discussion teaching method. Therefore, it can be concluded that the lecture with discussion teaching method was shown to enhance retention of athletic training knowledge over two injury topics, orbital blow out fracture and anaphylactic shock secondary to a bee sting, in students majoring in athletic training at the same four year university, compared with the case method, case with discussion method and lecture method of teaching.

Recommendations for Further Studies

The following recommendations are suggested for further studies:

1. A replication of the study utilizing different athletic training subject matter with a larger sample size to decrease the chance of a Type two error.

2. A replication of the study utilizing a different group of undergraduate athletic training majors and including practical applications of knowledge.

3. A replication of the study utilizing a pre-test to control for prior knowledge.

4. A study comparing the effectiveness of the case based method to lecture method on problem solving in athletic training.

5. A study comparing the effectiveness of the case based method to lecture method on the transfer of knowledge from a classroom setting to a practical field setting.

6. A replication of the study utilizing an eight week post-test delay time.

7. A study comparing the case based method of teaching with traditional lecture in two sections of the same athletic training course after case subjects have become comfortable with the novel method.

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APPENDICES

APPENDIX A

Human Subjects Approval Forms

OFFICE OF VICE PRESIDENT for Research, Graduate Studies and International Programs

OREGON STATE UNIVERSITY
Administrative Services A312 Corvallis, Oregon · 97331-2140
503-737-3437 FAX 503-737-3093 · INTERNET kellerg@ccmail.orst.edu

July 7, 1993

Principal Investigator:

The following project has been approved for exemption under the guidelines of Oregon State University's Committee for the Protection of Human Subjects and the U.S. Department of Health and Human Services:

Principal Investigator: Joanne B. Engel

Student's Name (if any): Lori D. Carter

Department: Education

Source of Funding:

Project Title: Effectiveness of Case Based Method vs. Traditional Lecture in the Retention of Athletic Training Knowledge

Comments:

A copy of this information will be provided to the Chair of the Committee for the Protection of Human Subjects. If questions arise, you may be contacted further.

Redacted for privacy

Mary E. Nunn
Sponsored Programs Officer

cc: CPHS Chair

Barry University
Institutional Review Board
Office of the Vice President for Academic Affairs

11300 NORTHEAST SECOND AVENUE
MIAMI SHORES, FLORIDA 33161-6695
Direct (305) 899-3020
FAX (305) 899-3026

Research with Human Subjects
Protocol Review

To: Lori D. Carter, Department of Sport and Exercise Sciences

From: Janice T. Thomas, ARNP, PhD., Chair

Date: September 7,1994

Protocol Number: 94-07-0013

Protocol Title: "Effectiveness of case-based method versus traditional lecture in the retention of athletic training knowledge"

The Board has reviewed your revised protocol and consent forms for the above study and has approved both. You may begin your study. If further changes are necessary, please submit the revisions to this board before proceeding further.

Signed consent forms for each subject should be kept for three years. You will be asked to report on your subjects yearly until the study is finished.

Please call the Chair if you have any questions (899-3823).

****

Note: The investigator will be solely responsible and strictly accountable for any deviation from or failure to follow the research protocol as approved and will hold Barry University harmless from all claims against it arising from said deviation or failure.

APPENDIX B

Case Studies

CASE STUDY ONE

Mike Bretson sat on the home team bench next to Orlando State University's Men's Basketball Coach, Jerry Wilkins. OSU was playing the University of Carolina in a conference game. OSU and UC men's basketball teams had a long standing rivalry especially between its' two centers, Keith Miller and David Johnson. Both were seniors and were expected to be high draft choices. This intensified their already physical rivalry which had erupted in a fight last season during the conference tournament. Mike Bretson was the Assistant Athletic Trainer at OSU assigned to men's basketball. Although the team had only suffered a few injuries thus far in the season, the competition between the two conference teams was heating up and Mike knew that something might happen. The last time these two teams had met was earlier in the season at the University of Carolina. OSU had won the game but had not walked away unscathed. The team's sixth man, Jason Felding had torn his anterior cruciate ligament and was out for the season.

Keith Miller, the center for OSU, was playing well but was getting elbowed heavily from UC's shorter center, David Johnson. Earlier in the season, Miller had kept Johnson to 15 points which was 17 below his season average of 32 so Johnson was out to return the favor. Mike was watching the play in the second half of the game as Johnson went up for his own rebound. When Johnson came down from his rebound, Miller was underneath him. Johnson put his elbows out trying to protect the ball and hit Miller in the right eye. Mike watched as Miller put his hand over his eye and staggered to the bench in obvious pain.

Miller sat down and after a bit of encouragement Mike was able to convince Keith to allow him to look at his injured eye . On initial inspection, Mike saw a 2 cm superficial laceration on the upper right lid that was bleeding minimally so he put on his latex surgical gloves that he kept in his hip pocket. Mike was able to stop the bleeding quickly by applying gentle direct pressure with a sterile gauze pad. Mike was careful not to apply too much pressure in case there was an underlying ocular injury. There was no other apparent deformity. From the athletic trainer's kit, Mike pulled out a near-vision card and a penlight because he knew that the first thing he needed to do was check Keith's visual acuity and observe his pupils. Mike needed the vision card to be 16 inches away

from Keith's eyes so he laid the near-vision card in Keith's lap. Mike asked Keith to cover his injured eye and read the smallest line of print that he could. Mike then asked Keith to do the same with the uninjured eye. It was easy for Mike to see where the 20/20 line of the card was because he had spilled some iodine and a spot of it had gotten on the card over the 20/20 marker. Keith's visual acuity was 20/20 in the left uninjured eye, 20/20 in the right injured eye, and 20/15 with both eyes. Since Keith did not wear contacts or glasses, Mike did not have to worry about damage to the eye caused by corrective lenses. From the results of Keith's preseason athletic physical, Mike knew that Keith's vision was normally 20/20 uncorrected. Since Keith's visual acuity was 20/20 in the injured eye, Mike was feeling better about the chances that Keith had not suffered a severe ocular injury because he knew that one of the first signs of an ocular injury was monocular diplopia or double vision in one eye. The next step was for Mike to check that Keith's pupils were equal, round, and reactive to light accomodation (PERRLA). Mike examined Keith's pupils checking for any irregularities in pupil size and shape from one pupil to the other. Using the penlight, Mike covered the uninjured eye for a few seconds in order to give the pupil time to dilate. Then Mike shown the penlight into the uninjured eye to determine whether Keith's pupil was reactive to light accommodation. Keith's pupil constricted immediately which was a normal response. Mike compared the response of the uninjured eye to Keith's injured eye. Both pupils accomodated to the light. With the penlight, Mike proceeded to examine Keith's cornea for scratches or lacerations. Mike looked at Keith's iris, the colored portion of the eye, to check for any edema or blood which may have accumulated in the eye's anterior chamber signaling a possible hyphema which is a medical emergency and would have necessitated immediate attention from an opthamologist. However, to Mike's relief, Keith's iris was clear and a bilateral comparison showed no differences from eye to eye in the pupil, cornea or sclera, the white of the eye.

Mike continued his examination of Keith's eye by testing his eye motility or movement in all planes of motion. Mike asked Keith to follow the penlight that he held in his hand with his eyes as Mike moved it up and down and to both sides. Keith had no trouble moving his injured eye except for when he had to elevate it or look up. When Mike raised the pen up, Keith's injured eye did not elevate as high as his uninjured eye. Mike asked Keith to read the banner that was high on the gym wall with his injured eye. Keith was not able to read the banner and

complained of pain and blurred vision. Keith's difficulty elevating his injured eye concerned Mike. He knew that the inability to elevate the eye was a main sign of an orbital blow-out fracture. Also, Keith had demonstrated no blurred vision until asked to elevate his eye. This was also a sign of a potential orbital blow-out fracture so Mike wasn't feeling as optimistic about Keith's eye injury as before.

In Mike's initial observation of Keith's eye, he had seen a 2 cm laceration on Keith's upper right lid that was bleeding minimally, however, the cut had stopped bleeding immediately with gentle direct pressure and was beginning to clot. Mike palpated around the orbit and found slight tenderness and edema on the superior aspect of the orbital rim but no crepitation which might indicate an orbital rim fracture. Mike continued to palpate around the eye and the rest of the midfacial bones . He was very specific about palpating the area of skin under the injured eye and the outside of the nose. Numbness over the cheek or lateral nose can be a sign of an infraorbital nerve injury. Keith exhibited no numbness in this or any other area of the eye.

Mike had conducted a thorough examination of Keith's eye by first checking his vision, then examining his pupils with a penlight, inspecting his cornea and sclera, observing eye movement in all planes, and finally by visually inspecting and palpating the area around the eye. Due to Keith's difficulty elevating his injured eye and the blurred vision that accompanied this movement, Mike suspected that Keith may have sustained an orbital blow-out fracture. Mike explained this to Keith and to the Men's Basketball Coach and he cautioned Keith not to blow his nose because the pressure could worsen the injury. With some types of eye injuries, Mike would have put a patch over both the athlete's eyes or applied ice to the swollen area. However, Mike suspected an orbital blow out fracture so he did not want to put any pressure on the injury. The eye was left uncovered. Mike called the attending opthamologist at the hospital emergency room and informed her of Keith's injury and told her that Keith was on his way.

CASE STUDY TWO

The first practice of the fall soccer season at Orlando State University (OSU) had begun. Jill Tremont, the athletic trainer for the women's soccer team was convinced that this year there were more athletes trying out for the team than ever before. Thirty-five new women's soccer players and seventeen OSU returners had shown up for physicals the previous night. Jill was a full time certified athletic trainer at Orlando State University. David Armesto was the student athletic trainer assigned to women's soccer. Although Jill was the staff athletic trainer for the team, David would be the athletic trainer traveling with the team and covering all the practices. Because it was the first day of soccer practice, Jill wanted to go over procedures with David to make sure he had everything he needed. David was a senior at Orlando State University and Jill was very confident that David would do well working with women's soccer. The night before, Jill and David had stayed late after physicals. They both went through the athletes' files and emergency cards. The emergency cards would be kept in David's athletic training kit for quick access. Jill always wanted herself and the student athletic trainer assigned to the team to be familiar with all the athletes' medical histories before practices began. They had seen nothing out of the ordinary in the athletes' medical files. Everyone except for Rhonda Jacobs was cleared for practice. Rhonda was an OSU returning player who had suffered a knee injury during the summer. Until Rhonda's knee was fully healed, she would act somewhat as a student coach since she was a senior and one of the better players on the team.

Practice had started at 8:00am and was almost three quarters of the way finished at 9:30am. Most of the practice had been conditioning and ball handling

drills. Already that morning, Jill and David had treated a few mild muscle strains and one moderately severe ankle sprain. The ankle sprain was sustained by one of the new players. Jill called the training room on the hand radio and had them send the golf cart to take the athlete back to the training room for treatment. At Orlando State University there was always a staff athletic trainer in the training room during practice hours and usually several student athletic trainers. All the athletic trainers who were assigned to field sports took hand radios out to the practice fields with them in case they needed to contact the training room or activate EMS.

Jill was watching practice as David was writing the injury report for the athlete who had suffered the ankle injury. Rhonda walked over with one of the new players, Christie Durham. Christie had not wanted to bother the athletic trainers, but Rhonda had insisted knowing that Jill wanted to be informed of every injury no matter how small. Rhonda explained to Jill and David that Christie had told her that she was feeling a little lightheaded and sick to her stomach. When Rhonda told Christie to go see the athletic trainers, Christie said that it was just the heat and it would go away. However, as Christie and Rhonda got closer to Jill, Christie began to feel weak and complained that her head hurt. Jill had Christie sit down and asked her what was wrong. Christie explained that there was nothing wrong and she didn't know why Rhonda had made her come over. Christie said that she had a little headache and her stomach was bothering her but that it was no big deal. Rhonda reminded her that she also said she was feeling dizzy as they were walking across the field. As Jill continued to question Christie about her symptoms, Jill noticed that Christie was scratching her arms. When Jill asked Christie why she was scratching her arms, Christie did not answer, but instead insisted that she needed to go back to practice. Although Jill did not know Christie well, she was surprised at her apparent irritability. Jill

asked Christie again why she was scratching her arms and noticed that Christie's right arm was red and appeared swollen. Christie explained that she had been stung by a bee in the right upper arm about 10 minutes ago and it was itching. As Jill looked more closely at Christie's arm, she noticed that it was red, swollen, and a firm elevation of the skin, what looked like a wheal or a hive was forming. Jill called David to get the emergency cards from the kit and asked Christie if she was allergic to bees although she did not recall seeing that on Christie's emergency card. Christie said that she had never been stung before so how would she know. Jill asked if anyone in Christie's family was allergic to bees knowing that allergies are often hereditary. Christie said that her younger brother had been taken to the hospital once after being stung by a bee. As Jill continued to inspect Christie's right arm it was obvious to Jill that Christie was having a localized reaction to the bee sting. However, Jill was concerned about a possible systemic reaction because Christie was also experiencing a headache, stomachache, dizziness and was irritable which Jill knew were all possible symptoms of anaphylaxis which can be a life-threatening response to an allergen. Jill was also aware that symptoms of anaphylaxis, or anaphylactic shock, could appear suddenly or take up to 30 minutes. As Jill continued to question Christie about her symptoms, Christie suddenly said she felt very weak and needed to lay down. Jill and David helped Christie to lay down on the outdoor treatment table. Jill asked David to get the blood pressure cuff, stethoscope and pen light from the athletic training kit so she could assess Christie's vital signs. Jill also had David get paper and pencil in order to record the vital signs. Jill took Christie's pulse at the radial artery in her wrist. Jill knew that a normal pulse rate is between 60 - 80 beats per minute for an adult but may be slightly lower in a trained athlete. Christie's pulse was rapid and weak. Next Jill observed Christie's breathing by looking at her chest rising and falling,

listening to the breath sounds and feeling Christie's breath on her cheek. Jill noted that Christie's respiration was shallow and she also noticed some wheezing. David handed the blood pressure cuff, stethoscope and penlight to Jill. Christie's blood pressure was 110/60, lower than the normal 120/80 which Jill knew could be a potential sign of shock. Jill used the penlight to check Christie's eyes. Jill observed that Christie's pupils were equal in size and that they reacted to the penlight by constricting evenly which was a normal response. Jill was relieved to see that neither pupil was dilated. Although, Christie was conscious she was not responding to questions quickly and she appeared confused. Jill felt Christie's skin with the back of her hand. It was cool and clammy to the touch. Since Christie was a dark skinned athlete, Jill was unable to determine if Christie's skin color was normal by looking at her face so she observed the skin color inside her lower lip. Christie's skin appeared pale. Jill again took Christie's blood pressure and saw that it was now 100/60. Christie's blood pressure was falling. Christie's blood pressure and Christie's other vital signs indicated to Jill that she was experiencing anaphylactic shock. Jill instructed David to call the athletic training room with the hand radio and have them call EMS. To treat Christie for shock, Jill elevated Christie's legs 8 inches and covered her with a light blanket in order to maintain Christie's normal body temperature. Jill maintained Christie's airway and kept her calm. While Jill continued to monitor Christie's vital signs, Christie began to cough and wheeze loudly. She complained that she couldn't get a breath because her throat was closing up. Jill recognized that Christie was experiencing respiratory distress which occurs in an advanced stage of anaphylactic shock. To make breathing easier, Jill had Christie rest in the position that was most comfortable for her. Christie choice to sit up. It was not the medical staff's policy to carry an anaphylaxis kit with epinephrine unless there was an athlete with a documented

need, so there was no anaphylaxis kit on the field. Therefore, Jill continued to reassure Christie and to monitor and record her vital signs in order to give the vitals to the EMS personnel when they arrived.

APPENDIX C

Letter to Expert Panel

May 24, 1994

Dear Dr. ;

My name is Lori Carter. I am an Assistant Professor of Athletic Training at Barry University in Miami Shores, Florida. I am also a doctoral candidate in Curriculum and Instruction at Oregon State University in Corvallis, Oregon. Currently, I am in the dissertation phase of my Ph.D.. The title of my dissertation is " Effectiveness of case-based method versus traditional lecture in the retention of athletic training knowledge".

Many different types of professional education programs are currently using the case-based method of teaching across their curriculums. The National Athletic Trainers' Association's Professional Education Committee (NATA-PEC) has also recommended that athletic training educators utilize case studies in their teaching. However, a controlled experiment to study the effectiveness of the case-based method of teaching has not been conducted. My dissertation is a controlled study to compare students' abilities to retain athletic training information when it is presented utilizing case study methodology versus presentation via traditional lecture.

In order to validate the testing tool, an expert panel comprised of directors of NATA approved athletic training curriculum programs is being formed. You were recommended by Dr. Carl Cramer of Barry University as someone who may be willing to offer your expertise in this matter. The maximum amount of your time will be one hour. Enclosed is a case study with a matching lecture outline, 20 multiple choice questions and 3 discussion questions. The task of the expert panel is to verify the following :

1. The information contained within the case study reflects current NATA standard of care guidelines.

2. The same key information contained within the case study is also contained in the accompanying lecture script.

3. The discussion questions arise logically from the injury topics.

4. The multiple-choice examination questions can be answered from both the information supplied within the case study and the accompanying lecture script.

I have included a form for you to answer the above questions. Please feel free to make additional comments. I would appreciate if the answer sheet could be mailed back to me by July 6, 1994 in the enclosed postage paid envelope.

I greatly appreciate your valuable time. My hope is that this study will make a contribution to the athletic training profession by increasing our knowledge of the various learning modalities that are successful in athletic training education. If you have any questions please feel free to call me at (305) 899-3574. Again, thank you for your time and effort.

Sincerely,

Lori D. Carter, EdM, ATC
Assistant Professor

APPENDIX D

Expert Panel Validation Form

EXPERT PANEL VALIDATION FORM FOR name of specific case

Please circle the response that you feel most accurately answers the following questions. If the answer is no, please explain in the comment section.
Feel free to use the back of the form for any additional comments.

1. Does the information contained within the case study reflect current NATA standard of care guidelines? YES NO

   Comments: _____

   _____

   _____

   _____

2. Are the same key points contained within the case study also contained in the accompanying lecture script? YES NO

   Comments: _____

   _____

   _____

   _____

3. Do the discussion questions arise logically from the injury topic?
   YES NO

   Comments: _____

   _____

   _____

   _____

4. Can the 20 multiple choice examination questions be answered from both the information supplied within the case study and the accompanying lecture script? YES NO

   Comments: _____

   _____

   _____

APPENDIX E

Lecture Scripts

LECTURE SCRIPT ONE

I. INITIAL INSPECTION

A. Vision

1. First check visual acuity utilizing a near-vision card.

a. Near-vision card should be kept in trainer's kit.

b. Card should be held approximately 16 inches away from athlete's eye.

c. Have athlete first cover the injured eye and read smallest line of print that they are able.

d. Next have athlete cover the uninjured eye and read smallest line of print that they are able.

e. Compare the injured eye with the uninjured eye.

f. Vision should be the same in both eyes or the same as observed during a pre-season physical examination.

g. It is important to determine whether athlete wears corrective lenses.

h. One of the first clinical signs of an ocular injury is monocular diplopia or double vision.

B. Eye Examination

1. Penlight should be kept in athletic training kit.

2. Pupils should be examined and compared for irregularities in pupil size and shape.

3. Determine that pupils are equal, round and reactive to light accommodation (PERRLA) by constricting when light is shown into eye.

4. Examine the cornea for scratches or lacerations.

5. Check the iris, the colored portion of eye, for hyphema.

a. Hyphema - edema or blood in the anterior chamber of the eye. A hyphema is a medical emergency.

6. Determine that the sclera appears white.

C. Motility

1. Eye movement should be checked in all planes of motion.

a. upward
b. downward
c. to both sides

2. Ask athlete to follow the end of the penlight with their eyes.

3. Inability to elevate the eye is a main sign of an orbital blow-out fracture.

4. Blurred vision upon eye elevation is a sign of a potential orbital blow-out fracture.

II. LID AND ORBIT INSPECTION

A. Inspect eyelids and orbit for:

1. Lacerations

2. Bleeding

a. Gloves should be worn.

b. To control bleeding, direct pressure should be gentle so as not to increase infraorbital pressure.

3. Discoloration or "Black Eye"

4. Edema

a. Do not place ice on a suspected orbital blow-out fracture. This may increase the pressure on the eye.

B. Palpation

1. Palpate around the orbit for tenderness.

2. Palpate around the orbit for crepitation that may indicate an orbital rim fracture.

3. Palpate the midfacial bones.

    1. Specifically palpate the area of skin under the injured eye and the area of skin outside of the nose.

    2. Numbness over the cheek or lateral nose can be a sign of an infraorbital nerve injury.

III. MANAGEMENT

A. If an orbital blow-out fracture is suspected:

1. Athlete should be referred to an opthamologist immediately.

2. Athlete should be instructed not blow their nose because this may increase the infraorbital pressure and worsen the injury.

3. Eye should not be covered because this will put pressure on the injury.

LECTURE SCRIPT TWO

I. ANAPHYLACTIC SHOCK or ANAPHYLAXIS

A. DEFINITION: A possible life-threatening response to an allergen.

B. CAUSE: Often occurs in response to an insect bite such as a bee sting.

C. PREPARATION:

1. Athletic trainers should be familiar with athlete's history regarding allergic reactions before the first practice of the season.

2. Allergies are often hereditary. It is important to be aware of any family history of allergic reactions, especially if athlete has never been stung before.

3. Athletic trainers should keep athlete emergency cards which include allergy information in the athletic training kit for quick reference.

4. A policy regarding possession of an anaphylactic kit should be in place for all teams. If there is a documented need, a kit should be available with personnel trained to administer the medication.

5. A rapid means of activating the EMS system should be in place.

D. SYMPTOMS

*** **INITIAL STAGES** ***

* Initial symptoms of anaphylactic shock may be confused with other ailments such as heat prostration, stomach aches, and headaches.

*Symptoms can appear immediately or take up to 30 minutes to appear.

1. Feeling of being lightheaded

2. General body weakness

3. Headache

4. Stomach pain

5. Dizziness

6. Localized or general itching

7. Irritability

8. Localized redness over or near bite site

9. Localized or general swelling

10. Appearance of a wheal, (i.e., firm elevation of the skin)

*** IN ADVANCED STAGES ***

11. Signs of respiratory distress

    a. Coughing

    b. Wheezing

    c. Difficulty breathing

    d. Feeling that the throat is closing up

12. Management of respiratory distress

    a. Activate EMS.

    b. Help athlete rest in a comfortable postion.

    c. Reassure the victim.

    d. Maintain normal body temparature.

    e. Keep athlete calm and continue to monitor vital signs while awaiting EMS.

E. V ITAL SIGNS

*Vital signs should be written down and given to the EMS personnel

1. Pulse

    a. Normal pulse

        1. Pulse is 60 - 80 beats/min in an adult. It may be slightly lower in a trained athlete.

    b. Possible sign of shock

        1. Pulse is rapid and weak

    c. Pulse should be taken over radial artery at wrist in conscious person.

2. Respiration

    a. Normal respiration

        1. Respiration is 12 breaths/min in an adult.

    b. Possible sign of shock

        1. Respiration is shallow and there may be wheezing.

    c. Look for the chest rising and falling
    Listen for the breath sounds
    Feel breath on cheek

3. Blood Pressure

    a. Normal blood pressure

        1. Normal blood pressure is 120/80 in an adult.

    b. Possible sign of shock

        1. Lower than normal blood pressure.
        2. "Falling" blood pressure which decreases over time.

    c. Use a stethoscope and blood pressure cuff.

4. Pupils

    a. Normal pupils

        1. Pupils should be equal in size and shape.
        2. Pupils should accommodate to light by constricting.

    b. Possible sign of shock

        1. Pupils are of unequal size or shape.
        2. One or both pupils are dilated and do not accommodate to light by constricting.

    c. Use a penlight

5. Level of consciousness

    a. Normal level of consciousness

        1. Alert and responsive

    b. Possible sign of shock

        1. Athlete does not appear alert and may be slow in answering questions.

        2. Athlete may appear confused or dazed.

        3. Athlete is not conscious

    c. Determine level of consciousness by observing athlete and asking questions.

6. Skin temperature

    a. Normal skin temperature

        1. Cool and dry

    b. Possible sign of shock

        1. Skin feels cool and clammy to the touch.

    c. Feel athlete's skin with the back of the hand

7. Skin color

    a. Normal skin color

        1. Skin color will depend on ethnicity. It should have a healthy glow or appear flushed after activity.

    b. Possible sign of shock

        1. Skin appears pale.

    c. View the color of the face or the inside of the lips for an athlete who has dark skin.

F. TREATING FOR SHOCK

1. Activate EMS
2. Maintain airway
3. Lay athlete on back and elevate the feet 8 to 12 inches.
4. Keep athlete calm
5. Maintain normal body temperature
6. Continue to monitor and record vital signs while waiting for EMS

APPENDIX F

Discussion Questions

DISCUSSION QUESTIONS

Case Study One

1. An athlete has sufferred a laceration over the eye with moderate bleeding. The athletic trainer suspects an orbital blow-out fracture. How should the athletic trainer manage this injury?

2. An athletic trainer must evaluate an eye injury. The athletic trainer does not have their medical supplies with them. How can the athletic trainer evaluate an eye injury without the normal evaluation tools?

3. An athlete who wears contact lenses suffers a potential orbital blow out fracture? How should the athletic trainer manage this injury?

Case Study Two

1. Should the athletic trainer have an anaphlaxis kit for all sports even if there is not a documented need? What are the potential drawbacks of having a kit?

2. Many athletes are stung by bees. When and how should an athletic trainer treat a bee sting and when should EMS be activated?

3. An athlete who is being treated for shock begins showing signs of respiratory distress. What changes should be made in managing this athlete who is now in respiratory distress?

APPENDIX G

Answer Sheet for Post-Tests

ANSWER SHEET

Orbital Fx Imm. Post-Test		Orbital Fx Delay Post-Test		Shock Imm. Post-Test		Shock Delay. Post-Test	
1.	D	1.	B	1.	C	1.	D
2.	B	2.	A	2.	B	2.	C
3.	C	3.	A	3.	D	3.	D
4.	A	4.	A	4.	B	4.	B
5.	B	5.	C	5.	C	5.	C
6.	A	6.	C	6.	E	6.	A
7.	B	7.	C	7.	A	7.	C
8.	C	8.	B	8.	E	8.	C
9.	D	9.	C	9.	B	9.	B
10.	D	10.	B	10.	C	10.	B
11.	E	11.	C	11.	D	11.	C
12.	A	12.	B	12.	B	12.	C
13.	C	13.	E	13.	E	13.	D
14.	E	14.	B	14.	A	14.	A
15.	B	15.	E	15.	D	15.	B
16.	E	16.	D	16.	A	16.	E
17.	C	17.	B	17.	A	17.	D
18.	D	18.	D	18.	D	18.	D
19.	E	19.	D	19.	C	19.	D
20.	A	20.	D	20.	E	20.	D

APPENDIX H

Multiple-Choice Examinations

Examination IA Subject code_____ Time start_____ Stop_____

Circle the response that **best** answers the question or completes the statement.

1. What structure should appear white in a normal eye?

   a. the iris
   b. the retina
   c. the anterior chamber
   d. the sclera
   e. the cornea

2. What does the athletic trainer look for first during initial examination of the athlete's pupils?

   a. The athletic trainer looks for a detached retina.
   b. The athletic trainer looks at the pupils' size and shape.
   c. The athletic trainer looks for scratches on the pupil.
   d. The athletic trainer looks for discoloration of the pupil.
   e. The athletic trainer looks to see if the pupils track properly.

3. Why is it important to conduct a sensory check over the cheek and lateral nose?

   a. Abnormal or heightened sensitivity indicates a potential orbital rim fracture.
   b. A sensory check is always conducted in an injury assessment.
   c. Numbness over the cheek or lateral nose may be a sign of an infraorbital nerve injury.
   d. A decrease in sensation over the cheek is a clear sign of an orbital blow-out fracture.
   e. The area of skin under the injured eye and lateral nose are especially prone to trauma.

4. What is the first thing that should be examined during evaluation of an eye injury?

   a. visual acuity
   b. pupillary response
   c. the cornea
   d. eye motility
   e. midfacial bones

5. A penlight should be kept in the training kit in order to check that the

   a. irises are opaque and lucid.
   b. pupils react to light.
   c. cornea reacts to light.
   d. retina is detached.
   e. sclera is yellow.

6. Which of the following symptoms are **not** indicative of a serious eye injury?

   a. excessive watering of the eye
   b. blurred vision
   c. diplopia
   d. decreased visual acuity
   e. decreased eye motility

7. What is a normal response of the pupils to light?

   a. When the pupils are covered they should constrict, when they are uncovered they should dilate.
   b. In the absence of light the pupils should dilate, when exposed to light they should constrict.
   c. When light is shown into the eye, both pupils should dilate to the same degree.
   d. The pupils should remain the same size whether in the dark or when a light is shown into the eye.
   e. The pupils should become smaller when in the dark and become larger when a light is shown into them.

8. One of the first clear clinical signs of an ocular injury is:

   a. a laceration around the eye.
   b. a "black eye".
   c. double vision in one eye.
   d. inability to open the eye.
   e. improper tracking.

9. Which of the following statements is true regarding managing edema following a suspected orbital blow-out fracture?

   a. Direct compression should be applied to control swelling.
   b. An ice bag should be held on the eye for 20 minutes out of every hour for the first 24 to 48 hours.
   c. The athlete should lay down with the head elevated 6 inches.
   d. Nothing should be done to control swelling until an orbital blow-out fracture has been ruled out by an opthamologist.
   e. The athlete can rub an ice cube over their eye in order to avoid getting a "black eye".

10. What is the correct method for managing a potential orbital blow-out fracture?

   a. Refer the athlete to a physician if vision problems persist after 24 hours.
   b. Place a patch over the injured eye and transport to the hospital.
   c. If the athlete is experiencing no pain, they may continue to play and then be referred to an opthamologist.
   d. Leave the eye uncovered and refer to an opthamologist immediately.
   e. Instruct the athlete not to blow their nose if they are experiencing blurred vision.

11. When managing a potential orbital blow-out fracture, the athlete should be instructed **not** to blow their nose

   a. because this will make it more difficult for the physician to do a thorough evaluation.
   b. because this will cause the pain to travel and will result in a headache.
   c. because the increased pressure will further diminish any neurological findings.
   d. because this will increase pressure in the sinus cavity and may cause the nose to bleed.
   e. because this may increase the infraorbital pressure and worsen the injury.

12. When assessing an athlete's visual acuity, which of the following statements is correct?

    a. The injured eye should be covered first in order to determine the visual acuity of the uninjured eye.
    b. The uninjured eye should be covered first in order to determine the visual acuity of the injured eye.
    c. Both eyes must be assessed at the same time in order to make a bilateral comparison.
    d. Only the injured eye needs to be assessed when determining visual acuity because the vision in the other eye is already known from the preseason physical.
    e. None of the above statements is correct.

13. Which of the following should be evaluated utilizing a penlight?

    a. an orbital rim fracture
    b. an infraorbital nerve injury
    c. a hyphema
    d. a scratch on the lens
    e. myopic vision

14. How does an athletic trainer know what is normal vision for an athlete?

    a. It can be determined by the athlete's lens perscription.
    b. The athlete can be asked this information during the history.
    c. By making a bilateral comparison, normal vision can be determined.
    d. If an athlete is able to read a score board their vision is normal.
    e. The athletic trainer can refer to the preseason physical exam.

15. In order to assess eye motility, which of the following procedures is correct?

    a. The athletic trainer asks the athlete to cover one eye and look up and down.
    b. The athletic trainer asks the athlete to follow the movements of the end of a penlight which the athletic trainer moves up, down and to both sides.
    c. The athletic trainer asks the athlete to look at the ceiling and then at the floor.
    d. While looking straight ahead, the athletic trainer asks the athlete to look down and to the right and then up and to the left.
    e. The athletic trainer asks the athlete to move their eyes in all directions that are pain free.

16. Which of the following is a clinical sign of an orbital blow-out fracture?

    a. Blood accumulated in the anterior chamber of the eye.
    b. Crepitation upon palpation of the orbital rim.
    c. Discoloration around the eye.
    d. Excessive tear production.
    e. Blurred vision or inability to elevate the eye.

17. For normal visual acuity following an eye injury, what line of print on the near vision card should an athlete be able to read with their injured eye?

    a. The athlete must be able to read the 20/20 vision line.
    b. The line of print does not matter as long as the print does not appear blurry.
    c. The athlete should be able to read the same line of print with the injured eye as they can with the uninjured eye or as they did before they were injured.
    d. It is not important to know which line of print the athlete is able to read as long as they can read any line holding the card at arms length.
    e. The athlete should be able to read one line smaller on the near vision card with the uninjured eye than they can with the injured eye.

18. In order to assess visual acuity, a near vision card can be placed in the athlete's lap so that

    a. the athletic trainers' hands are free.
    b. the card does not move around when in use.
    c. the athletic trainer can more easily see the line of print the athlete is reading.
    d. the card is approximately 16 inches away from the athlete's eye.
    e. the athlete's head is bent in order to shield the eye from the light.

19. To control bleeding around the eye, following an orbital injury, which of the following procedures is correct?

    a. The athletic trainer should put gloves on and apply firm direct pressure to the site of injury.
    b. The athletic trainer should place a sterile gauze pad on the site of injury and place an ice bag over the site of injury.
    c. The athletic trainer should put gloves on and apply gentle direct pressure over the site of injury before placing an ice bag on the injury.
    d. The athletic trainer should let the cut bleed freely in order to wash out any contaminants.
    e. The athletic trainer should put gloves on and apply gentle direct pressure over the site of injury.

20. In order to assess visual acuity in an athlete who has suffered an eye injury, it is important to know

    a. if the athlete wears corrective lenses.
    b. if their family has a history of eye injuries.
    c. if they are in pain.
    d. if they can move their eye up and down.
    e. if they are taking any medication.

Examination IB Subject code _____ Start time____ Stop_____

Circle the response that **best** answers the question or completes the statement.

1. What does the athletic trainer look for first during initial examination of the athlete's pupils?

   a. The athletic trainer looks for a detached retina.
   b. The athletic trainer looks at the pupils' size and shape.
   c. The athletic trainer looks for scratches on the pupil.
   d. The athletic trainer looks for discoloration of the pupil.
   e. The athletic trainer looks to see if the pupils track properly.

2. When assessing an athlete's visual acuity, which of the following statements is correct?

   a. The injured eye should be covered first in order to determine the visual acuity of the uninjured eye.
   b. The uninjured eye should be covered first in order to determine the visual acuity of the injured eye.
   c. Both eyes must be assessed at the same time in order to make a bilateral comparison.
   d. Only the injured eye needs to be assessed when determining visual acuity because the vision in the other eye is already known from the preseason physical.
   e. None of the above statements is correct.

3. What is the first thing that should be examined during evaluation of an eye injury?

   a. visual acuity
   b. pupillary response
   c. the cornea
   d. eye motility
   e. midfacial bones

4. In order to assess visual acuity in an athlete who has suffered an eye injury, it is important to know

   a. if the athlete wears corrective lenses.
   b. if their family has a history of eye injuries.
   c. if they are in pain.
   d. if they can move their eye up and down.
   e. if they are taking any medication.

5. Which of the following should be evaluated utilizing a penlight?

   a. an orbital rim fracture
   b. an infraorbital nerve injury
   c. a hyphema
   d. a scratch on the lens
   e. myopic vision

6. For normal visual acuity following an eye injury, what line of print on the near vision card should an athlete be able to read with their injured eye?

   a. The athlete must be able to read the 20/20 vision line.
   b. The line of print does not matter as long as the print does not appear blurry.
   c. The athlete should be able to read the same line of print with the injured eye as they can with the uninjured eye or as they did before they were injured.
   d. It is not important to know which line of print the athlete is able to read as long as they can read any line holding the card at arms length.
   e. The athlete should be able to read one line smaller on the near vision card with the uninjured eye than they can with the injured eye.

7. One of the first clear clinical signs of an ocular injury is:

   a. a laceration around the eye.
   b. a "black eye".
   c. double vision in one eye.
   d. inability to open the eye.
   e. improper tracking.

8. Which of the following symptoms are **not** indicative of a serious eye injury?

   a. blurred vision
   b. excessive watering of the eye
   c. diplopia
   d. decreased visual acuity
   e. decreased eye motility

9. Why is it important to conduct a sensory check over the cheek and lateral nose?

   a. Abnormal or heightened sensitivity indicates a potential orbital rim fracture.
   b. A sensory check is always conducted in an injury assessment.
   c. Numbness over the cheek or lateral nose may be a sign of an infraorbital nerve injury.
   d. A decrease in sensation over the cheek is a clear sign of an orbital blow-out fracture.
   e. The area of skin under the injured eye and lateral nose are especially prone to trauma.

10. A penlight should be kept in the training kit in order to check that the

   a. irises are opaque and lucid.
   b. pupils react to light.
   c. cornea reacts to light.
   d. retina is detached.
   e. sclera is yellow.

11. To control bleeding around the eye, following an orbital injury, which of the following procedures is correct?

   a. The athletic trainer should put gloves on and apply firm direct pressure to the site of injury.
   b. The athletic trainer should place a sterile gauze pad on the site of injury and place an ice bag over the site of injury.
   c. The athletic trainer should put gloves on and apply gentle direct pressure over the site of injury.
   d. The athletic trainer should let the cut bleed freely in order to wash out any contaminants.
   e. The athletic trainer should put gloves on and apply gentle direct pressure over the site of injury before placing an ice bag on the injury.

12. Which of the following is a clinical sign of an orbital blow-out fracture?

   a. Blood accumulated in the anterior chamber of the eye.
   b. Blurred vision or inability to elevate the eye.
   c. Discoloration around the eye.
   d. Excessive tear production.
   e. Crepitation upon palpation of the orbital rim.

13. When managing a potential orbital blow-out fracture, the athlete should be instructed **not** to blow their nose

    a. because this will make it more difficult for the physician to do a thorough evaluation.
    b. because this will cause the pain to travel and will result in a headache.
    c. because the increased pressure will further diminish any neurological findings.
    d. because this will increase pressure in the sinus cavity and may cause the nose to bleed.
    e. because this may increase the infraorbital pressure and worsen the injury.

14. What is a normal response of the pupils to light?

    a. When the pupils are covered they should constrict, when they are uncovered they should dilate.
    b. In the absence of light the pupils should dilate, when exposed to light they should constrict.
    c. When light is shown into the eye, both pupils should dilate to the same degree.
    d. The pupils should remain the same size whether in the dark or when a light is shown into the eye.
    e. The pupils should become smaller when in the dark and become larger when a light is shown into them.

15. How does an athletic trainer know what is normal vision for an athlete?

    a. It can be determined by the athlete's lens perscription.
    b. The athlete can be asked this information during the history.
    c. By making a bilateral comparison, normal vision can be determined.
    d. If an athlete is able to read a score board their vision is normal.
    e. The athletic trainer can refer to the preseason physical exam.

16. What is the correct method for managing a potential orbital blow-out fracture?

    a. Refer the athlete to a physician if vision problems persist after 24 hours.
    b. Place a patch over the injured eye and transport to the hospital.
    c. If the athlete is experiencing no pain, they may continue to play and then be referred to an opthamologist.
    d. Leave the eye uncovered and refer to an opthamologist immediately.
    e. Instruct the athlete not to blow their nose if they are experiencing blurred vision.

17. In order to assess eye motility, which of the following procedures is correct?

    a. The athletic trainer asks the athlete to cover one eye and look up and down.
    b. The athletic trainer asks the athlete to follow the movements of the end of a penlight which the athletic trainer moves up, down and to both sides.
    c. The athletic trainer asks the athlete to look at the ceiling and then at the floor.
    d. While looking straight ahead, the athletic trainer asks the athlete to look down and to the right and then up and to the left.
    e. The athletic trainer asks the athlete to move their eyes in all directions that are pain free.

18. What structure should appear white in a normal eye?

    a. the iris
    b. the retina
    c. the anterior chamber
    d. the sclera
    e. the cornea

19. Which of the following statements is true regarding managing edema following a suspected orbital blow-out fracture?

    a. Direct compression should be applied to control swelling.
    b. An ice bag should be held on the eye for 20 minutes out of every hour for the first 24 to 48 hours.
    c. The athlete should lay down with the head elevated 6 inches.
    d. Nothing should be done to control swelling until an orbital blow-out fracture has been ruled out by an opthamologist.
    e. The athlete can rub an ice cube over their eye in order to avoid getting a "black eye".

20. In order to assess visual acuity, a near vision card can be placed in the athlete's lap so that

    a. the athletic trainers' hands are free.
    b. the card does not move around when in use.
    c. the athletic trainer can more easily see the line of print the athlete is reading.
    d. the card is approximately 16 inches away from the athlete's eye.
    e. the athlete's head is bent in order to shield the eye from the light.

Examination IIA Subject code _____ Start time_____ Stop _____

Circle the response that **best** answers the question or completes the statement.

1. What is one of the first signs that an athlete is having an allergic reaction to a bee sting?

   a. difficulty speaking
   b. coughing
   c. itching
   d. rapid respiration
   e. swelling of throat

2. One of the body's responses to anaphylactic shock that may make breathing difficult is

   a. the eruption of hives over the body surface.
   b. the swelling and closing of the throat.
   c. the decrease in lung size.
   d. the drying of the air passages.
   e. the increase in the rate of respiration.

3. Which of the following pupil responses may signal that an athlete is in shock?

   a. The pupils are equal in size.
   b. Both pupils constrict when a light in shown into them.
   c. The pupils are the same shape.
   d. One or both pupils are fixed and dilated.
   e. Both pupils accommodate to light.

4. Emergency information regarding an athlete's medical history

   a. should be kept in a locked cabinet in the training room that is only assessable to certified staff members.
   b. should be kept in the team athletic training kit for immediate assess.
   c. should be memorized by the athletic trainer assigned to the team.
   d. should only be kept in the physician's office.
   e. should only be recorded in the athlete's medical file and kept in the training room.

5. Which of the following should **not** be done to treat an athlete for shock?

   a. Keep the athlete calm.
   b. Elevate the athlete's feet 8 to 12 inches.
   c. Cover the athlete in thick blankets to keep them slightly warmer than normal.
   d. Continue to monitor the athlete's vital signs while waiting for EMS.
   e. Maintain the athlete's airway and look, listen, and feel for breathing.

6. What is the proper method that should be used in the field to assess the skin temperature of an injured athlete?

   a. Look to see if the skin appears flushed or white.
   b. Feel the athlete's forehead and then your own for comparison.
   c. Put a thermometer against the athlete's skin.
   d. It is not possible to assess skin temperature.
   e. Feel athlete's skin with the back of your hand.

7. Which of the following would you **not** expect to see in an athlete who is in shock?

   a. The athlete responds promptly and logically to questions.
   b. The athlete appears confused when questioned.
   c. The athlete is able to answer questions but does so slowly.
   d. The athlete is not conscious.
   e. The athlete is not alert and appears dazed.

8. An athlete who is experiencing respiratory distress should be placed in what position?

   a. sitting up
   b. lying in a reclining position
   c. lying on their back
   d. lying on their side with knees drawn up
   e. the position that is most comfortable

9. An athlete who is in shock will usually demonstrate a pulse that is

   a. between 40 - 60 beats per minute.
   b. rapid and weak.
   c. shallow and slow.
   d. strong and regular.
   e. strong but irregular.

10. Which of the following would you expect to find in an athlete who is in shock?

    a. Respiration that is 12 breaths per minute.
    b. Respiration that is deep and full.
    c. Respiration that is shallow with wheezing.
    d. Respiration that only occurs through the mouth.
    e. Changes in respiration do not occur with shock.

11. In **advanced** stages of anaphylactic shock, an athlete may experience:

    a. localized redness over the site of the bite
    b. mild dizziness
    c. general body weakness
    d. respiratory distress
    e. a headache

12. What equipment needs to be kept on the field to evaluate an athlete who may be suffering from anaphylactic shock?

    a. penlight, reflex hammer, blood pressure cuff, pencil and paper
    b. blood pressure cuff, stethoscope, pen light, pencil and paper
    c. stethoscope, blood pressure cuff, vision card and reflex hammer
    d. penlight, reflex hammer, pencil and paper
    e. vision card, stethoscope, reflex hammer, pencil and paper

13. If an athlete has never been stung by a bee before

    a. they should receive allergy tests to determine if they are allergic.
    b. an anaphylactic kit should be kept just in case they turn out to have an allergic reaction to a bee sting.
    c. it is very unlikely that they will be stung because they have a natural immunity to bee stings.
    d. they will be more sensitive to a bee sting then a person who has been stung before.
    e. they should be questioned regarding their family history of allergies and allergic reactions to bee stings.

14. Since anaphylactic shock can be life-threatening, what precautions must be taken with high risk sports prior to participation?

    a. A rapid means of activating the Emergency Medical Services should be in place before the season begins.
    b. All athletes should be allergy tested to determine their sensitivity to bee stings.
    c. An athlete who has suffered anaphylactic shock before should be disqualified from participation.
    d. Athletes who have known allergies to bee stings should be prevented from participating during the time when there are bees nearby.
    e. Athletes should be instructed not to wear perfume or cologne because this attracts bees.

15. When monitoring the pulse of a conscious athlete

    a. the pulse should be taken over the carotid artery in the neck.
    b. the pulse should be taken over the ulnar artery in the wrist.
    c. the pulse can be determined by the blood pressure.
    d. the pulse should be taken at the radial artery in the wrist.
    e. the pulse should be taken at the femoral artery in the groin.

16. What should you do to assess an athlete's breathing?

    a. Watch the chest rise and fall.
    b. Look at the athlete's mouth.
    c. Put your hand to the athlete's mouth.
    d. Put a mirror to the athlete's nose.
    e. Put your head on the athlete's chest.

17. Anaphylactic shock may be difficult to detect because

    a. the initial symptoms may be confused with other ailments.
    b. the affected person is not cooperative.
    c. symptoms do not appear for 30 minutes.
    d. it is very uncommon in an athletic population.
    e. a person suffering from anaphylaxis has no symptoms.

18. To determine skin color in a dark skinned athlete, you should observe

    a. the color of the face.
    b. the color of the eyelids.
    c. the color of the tongue.
    d. the color of the inside of the lip.
    e. the color of the neck.

19. An athlete who is in shock is most likely to demonstrate which of the following blood pressures?

    a. 150/90
    b. 120/80
    c. 110/60
    d. 130/80
    e. 160/70

20. Skin temperature should be assessed when evaluating an athlete's vital signs. Which of the following may indicate that an athlete is in shock?

    a. Skin feels hot and dry to the touch.
    b. Skin feels warm and moist to the touch.
    c. Skin feels cool and dry to the touch.
    d. Skin feels hot and wet to the touch.
    e. Skin feels cool and clammy to the touch.

Examination IIB Subject code _____ Start time_____ Stop _____

Circle the response that **best** answers the question or completes the statement.

1. Since anaphylactic shock can be life-threatening, what precautions must be taken with high risk sports prior to participation?

   a. A rapid means of activating the Emergency Medical Services should be in place before the season begins.
   b. All athletes should be allergy tested to determine their sensitivity to bee stings.
   c. An athlete who has suffered anaphylactic shock before should be disqualified from participation.
   d. Athletes who have known allergies to bee stings should be prevented from participating during the time when there are bees nearby.
   e. Athletes should be instructed not to wear perfume or cologne because this attracts bees.

2. An athlete who is experiencing respiratory distress should be placed in what position?

   a. sitting up
   b. lying in a reclining position
   c. lying on their back
   d. lying on their side with knees drawn up
   e. the position that is most comfortable

3. Which of the following pupil responses may signal that an athlete is in shock?

   a. The pupils are equal in size.
   b. Both pupils constrict when a light in shown into them.
   c. The pupils are the same shape.
   d. One or both pupils are fixed and dilated.
   e. Both pupils accommodate to light.

4. Emergency information regarding an athlete's medical history

   a. should be kept in a locked cabinet in the training room that is only assessable to certified staff members.
   b. should be kept in the team athletic training kit for immediate assess.
   c. should be memorized by the athletic trainer assigned to the team.
   d. should only be kept in the physician's office.
   e. should only be recorded in the athlete's medical file and kept in the training room.

5. An athlete who is in shock is most likely to demonstrate which of the following blood pressures?

   a. 150/90
   b. 120/80
   c. 110/60
   d. 130/80
   e. 160/70

6. Which of the following would you **not** expect to see in an athlete who is in shock?

   a. The athlete responds promptly and logically to questions.
   b. The athlete appears confused when questioned.
   c. The athlete is able to answer questions but does so slowly.
   d. The athlete is not conscious.
   e. The athlete is not alert and appears dazed.

7. Which of the following should **not** be done to treat an athlete for shock?

   a. Keep the athlete calm.
   b. Elevate the athlete's feet 8 to 12 inches.
   c. Cover the athlete in thick blankets to keep them slightly warmer than normal.
   d. Continue to monitor the athlete's vital signs while waiting for EMS.
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   c. itching
   d. rapid respiration
   e. swelling of throat.

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   e. strong but irregular.

10. One of the body's responses to anaphylactic shock that may make breathing difficult is

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    c. the decrease in lung size.
    d. the drying of the air passages.
    e. the increase in the rate of respiration.

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    c. it is very unlikely that they will be stung because they have a natural immunity to bee stings.
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    c. Put your hand to the athlete's mouth.
    d. Put a mirror to the athlete's nose.
    e. Put your head on the athlete's chest.

15. What equipment needs to be kept on the field to evaluate an athlete who may be suffering from anaphylactic shock?

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    b. blood pressure cuff, stethoscope, pen light, pencil and paper
    c. stethoscope, blood pressure cuff, vision card and reflex hammer
    d. penlight, reflex hammer, pencil and paper
    e. vision card, stethoscope, reflex hammer, pencil and paper

16. What is the proper method that should be used in the field to assess the skin temperature of an injured athlete?

    a. Look to see if the skin appears flushed or white.
    b. Feel the athlete's forehead and then your own for comparison.
    c. Put a thermometer against the athlete's skin.
    d. It is not possible to assess skin temperature.
    e. Feel athlete's skin with the back of your hand.

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    c. the pulse can be determined by the blood pressure.
    d. the pulse should be taken at the radial artery in the wrist.
    e. the pulse should be taken at the femoral artery in the groin.

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    b. the color of the eyelids.
    c. the color of the tongue.
    d. the color of the inside of the lip.
    e. the color of the neck.

19. In **advanced** stages of anaphylactic shock, an athlete may experience:

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    b. mild dizziness
    c. general body weakness
    d. respiratory distress
    e. a headache

20. Skin temperature should be assessed when evaluating an athlete's vital signs. Which of the following may indicate that an athlete is in shock?

a. Skin feels hot and dry to the touch.
b. Skin feels warm and moist to the touch.
c. Skin feels cool and dry to the touch.
d. Skin feels hot and wet to the touch.
e. Skin feels cool and clammy to the touch.

APPENDIX I

History Effect Questionnaire

Subject code _____

UPDATE

Please answer the following questions openly and honestly.

1. Since the last testing session, did you do anything that increased your knowledge of the injury topic or topics outside of the testing sessions? YES or NO _____. If yes, what did you do?_____

_____.

2. Did you discuss any aspect of this study with anyone other than the primary researcher, Ms. Carter? YES or NO _____. If yes, who did you speak to and what did you speak to them about?

_____

_____.

APPENDIX J

Attitude Questionnaires

Subject Code:_____

ATTITUDE QUESTIONNAIRE FOR C GROUP

Circle the number that most closely matches your response.

1. In this study you were presented the injury topic, emergency management of anaphylactic shock, by the case study method of teaching. How well do you think you learned the material with this method?

1	2	3	4	5	6	7
Low						High

2. If you had been presented emergency management of anaphylactic shock by the case study method with a discussion session, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

3. If you had been presented emergency management of anaphylactic shock by the lecture method of teaching, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

4. If you had been presented emergency management of anaphylactic shock by the lecture method of teaching with a discussion session, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

Subject Code:_____

ATTITUDE QUESTIONNAIRE FOR CD GROUP

Circle the number that most closely matches your response.

1. In this study you were presented the injury topic, emergency management of anaphylactic shock, by the case study method of teaching with a discussion session. How well do you think you learned the material with this method?

1	2	3	4	5	6	7
Low						High

2. If you had been presented emergency management of anaphylactic shock by the case study method without a discussion session, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

3. If you had been presented emergency management of anaphylactic shock by the lecture method of teaching, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

4. If you had been presented emergency management of anaphylactic shock by the lecture method of teaching with a discussion session, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

Subject Code:_____

ATTITUDE QUESTIONNAIRE FOR L GROUP

Circle the number that most closely matches your response.

1. In this study you were presented the injury topic, emergency management of anaphylactic shock, by the lecture method of teaching. How well do you think you learned the material with this method?

1	2	3	4	5	6	7
Low						High

2. If you had been presented emergency management of anaphylactic shock by the lecture method with a discussion session, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

3. If you had been presented emergency management of anaphylactic shock by the case study method of teaching, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

4. If you had been presented emergency management of anaphylactic shock by the case study method of teaching with a discussion session, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

Subject Code:_____

ATTITUDE QUESTIONNAIRE FOR LD GROUP

Circle the number that most closely matches your response.

1. In this study you were presented the injury topic, emergency management of anaphylactic shock, by the lecture method of teaching with a discussion session. How well do you think you learned the material with this method?

1	2	3	4	5	6	7
Low						High

2. If you had been presented emergency management of anaphylactic shock by the lecture method without a discussion session, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

3. If you had been presented emergency management of anaphylactic shock by the case study method of teaching, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

4. If you had been presented emergency management of anaphylactic shock by the case study method of teaching with a discussion session, how well do you think you would have learned the material?

1	2	3	4	5	6	7
Low						High

APPENDIX K

Human Consent Form

INFORMED CONSENT

My name is Ms. Lori D. Carter. I am an Assistant Professor in the Department of Sport and Exercise Sciences at Barry University. The study that you will participate in is a research study that is comparing different methods of teaching athletic training. It is hoped that this research may increase our knowledge of the effectiveness of different methods of teaching athletic training. It should also increase your individual knowledge of the management of the specific athletic injuries that will be covered in the study. Your time commitment to this study is a maximum of four hours spread out over four different test dates within a five week period of time.

You will be randomly assigned to one of four treatment conditions where you are presented information on an athletic injury by one of four teaching methods which are commonly utilized in the classroom. After the information is presented, you will be given a written multiple-choice examination on the material presented immediately following and again four weeks later. You will meet at a second testing date where you will be presented information on a second athletic injury by one of four teaching methods which are commonly utilized in the classroom. After the information is presented, you will be given a second written multiple-choice examination on the material presented immediately following and again four weeks later. All examination results will be kept locked in a cabinet in the researcher's office during the duration of the study. After the last examination is administered, you will be asked to complete an attitude questionnaire concerning the teaching methods utilized in this study. Upon the conclusion of this study, you will be given the results of your examinations.

You will be assigned a subject number which will be used for all examination reports. All examination results will be reported utilizing the subject number not the subject name. Confidentiality will be maintained at all times.

Questions about the research, your rights, or concerns should be directed to Ms. Lori D. Carter at (305) 899-3574.

Participation in this study is strictly voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

_____ _____

NAME (please print) DATE

_____ _____

SIGNATURE PRINCIPLE INVESTIGATOR

APPENDIX L

Subject Testing Schedules

ATHLETIC TRAINING STUDY
TESTING SCHEDULE
TREATMENT GROUP I

Time: 12:00 pm

Location: Health and Sport Center, Room 1a

Date:

Testing session one: Wednesday, 9/7/94

Testing session two: Friday, 9/16/94

Testing session three: Wednesday, 10/5/94

Testing session four: Friday, 10/14/94

ATHLETIC TRAINING STUDY
TESTING SCHEDULE
TREATMENT GROUP II

Time: 12:00 pm

Location: Health and Sport Center, Room 1a

Date:

Testing session one: Friday, 9/9/94

Testing session two: Monday, 9/19/94

Testing session three: Friday, 10/7/94

Testing session four: Monday, 10/17/94

ATHLETIC TRAINING STUDY
TESTING SCHEDULE
TREATMENT GROUP III

Time: 12:00 pm

Location: Health and Sport Center, Room 1a

Date:

Testing session one: Monday, 9/12/94

Testing session two: Wednesday, 9/21/94

Testing session three: Monday, 10/10/94

Testing session four: Wednesday, 10/19/94

ATHLETIC TRAINING STUDY
TESTING SCHEDULE
TREATMENT GROUP IV

Time: 12:00 pm

Location: Health and Sport Center, Room 1a

Date:

Testing session one: Wednesday, 9/14/94

Testing session two: Wednesday, 9/28/94

Testing session three: Wednesday, 10/12/94

Testing session four: Monday, 10/24/94